Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 6248R, 3.00 GHz)

SPEC®2017_int_base = 11.1
SPEC®2017_int_peak = 11.4

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.
Test Date: May-2020
Hardware Availability: Feb-2020
Software Availability: Apr-2020

| Threads | 0.0  | 1.0  | 2.0  | 3.0  | 4.0  | 5.0  | 6.0  | 7.0  | 8.0  | 9.0  | 10.0 | 11.0 | 12.0 | 13.0 | 14.0 | 15.0 | 16.0 | 17.0 | 18.0 | 19.0 | 20.0 | 21.0 | 22.0 | 23.0 | 24.0 | 25.0 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 600.perlbench_s | 96  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 602.gcc_s | 96  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 605.mcf_s | 96  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 620.omnetpp_s | 96  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 623.xalanchmk_s | 96  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 625.x264_s | 96  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 631.deepsjeng_s | 96  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 641.leela_s | 96  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 648.exchange2_s | 96  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 657.xz_s | 96  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

SPECspeed®2017_int_base (11.1) SPECspeed®2017_int_peak (11.4)

**Hardware**

CPU Name: Intel Xeon Gold 6248R
Max MHz: 4000
Nominal: 3000
Enabled: 48 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: 35.75 MB I+D on chip per core
Other: None
Memory: 384 GB (10 x 32 GB 2Rx4 PC4-2933Y-R; 2 x 32 GB 2Rx4 PC4-3200AA-R, running at 2933)
Storage: 1 x 960GB SATA SSD
Other: None

**Software**

OS: Red Hat Enterprise Linux 8.1
kernel 4.18.0-147.el8.x86_64
Compiler: C/C++: Version 19.1.1.217 of Intel C/C++
Compiler for Linux;
Fortran: Version 19.1.1.217 of Intel Fortran
Compiler for Linux
Parallel: Yes
Firmware: Version 2.7.3 released Mar-2020
File System: tmpfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS set to prefer performance at the cost of additional power usage
## Dell Inc.

**PowerEdge C6420 (Intel Xeon Gold 6248R, 3.00 GHz)**

**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** May-2020  
**Hardware Availability:** Feb-2020  
**Software Availability:** Apr-2020

### Results Table

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</table>

### Compiler Notes

The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler. The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux  
The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux

### 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"

### Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
KMP_AFFINITY = "granularity=fine,scatter"  
LD_LIBRARY_PATH = 
"/dev/shm/cpu2017-ic19.1u1/lib/intel64:/dev/shm/cpu2017-ic19.1u1/je5.0.1-64"  
MALLOC_CONF = "retain:true"  
OMP_STACKSIZE = "192M"
Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 6248R, 3.00 GHz)

| SPECspeed®2017_int_base = 11.1 |
| SPECspeed®2017_int_peak = 11.4 |

**General Notes**

Binaries compiled on a system with 1x Intel Core i9-9900K CPU + 64GB RAM

memory using Redhat Enterprise Linux 8.0

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>
```

Benchmark run from a 225 GB ramdisk created with the cmd; "mount -t tmpfs -o size=225G tmpfs /mnt/ramdisk"


**Platform Notes**

BIOS settings:

Sub NUMA Cluster enabled

Virtualization Technology 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

Logical Processor enabled

CPU Interconnect Bus Link Power Management disabled

PCI ASPM L1 Link Power Management disabled

UPI Prefetch enabled

LLC Prefetch disabled

Dead Line LLC Alloc enabled

Directory AtoS disabled

Sysinfo program /dev/shm/cpu2017-ic19.1u1/bin/sysinfo

Rev: r6365 of 2019-08-21 295195f888a3d7edbe1e6e46a485a0011

running on localhost.localdomain Wed Jun 24 10:45:28 2020

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

(Continued on next page)
Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 6248R, 3.00 GHz)

SPECspeed®2017_int_base = 11.1
SPECspeed®2017_int_peak = 11.4

CPU2017 License: 55
Test Date: May-2020
Test Sponsor: Dell Inc.
Hardware Availability: Feb-2020
Tested by: Dell Inc.
Software Availability: Apr-2020

Platform Notes (Continued)

From /proc/cpuinfo

- model name: Intel(R) Xeon(R) Gold 6248R CPU @ 3.00GHz
- 2 "physical id"s (chips)
- 96 "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: 24
- siblings: 48
- physical 0: cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
- physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29

From lscpu:

- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 96
- On-line CPU(s) list: 0-95
- Thread(s) per core: 2
- Core(s) per socket: 24
- Socket(s): 2
- NUMA node(s): 4
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Gold 6248R CPU @ 3.00GHz
- Stepping: 7
- CPU MHz: 3562.058
- CPU max MHz: 4000.0000
- CPU min MHz: 1200.0000
- BogoMIPS: 6000.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 36608K
- 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

(Continued on next page)
SPEC CPU®2017 Integer Speed Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 6248R, 3.00 GHz)

SPECspeed®2017_int_base = 11.1
SPECspeed®2017_int_peak = 11.4

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

Test Date: May-2020
Hardware Availability: Feb-2020
Software Availability: Apr-2020

Platform Notes (Continued)

aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xptr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 cdp_l3
invpcid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
flexpriority ept vpid fsqgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
cqm mpx rdrt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total
cqm_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d
arch_capabilities

/proc/cpuinfo cache data
 cache size : 36608 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
 node 0 size: 95304 MB
 node 0 free: 85197 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
 node 1 size: 96737 MB
 node 1 free: 96514 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
 node 2 size: 96763 MB
 node 2 free: 96231 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
 node 3 size: 96762 MB
 node 3 free: 96388 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: 394821696 kB
 HugePages_Total: 0
 Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:
 NAME="Red Hat Enterprise Linux"
 VERSION="8.1 (Ootpa)"
 ID="rhel"
 ID_LIKE="fedora"
 VERSION_ID="8.1"

(Continued on next page)
SPEC CPU®2017 Integer Speed Result

Dell Inc.
PowerEdge C6420 (Intel Xeon Gold 6248R, 3.00 GHz)

<table>
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<tr>
<th>CPU2017 License:</th>
<th>55</th>
<th>Test Date:</th>
<th>May-2020</th>
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<td>Test Sponsor:</td>
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<td>Hardware Availability:</td>
<td>Feb-2020</td>
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<tr>
<td>Tested by:</td>
<td>Dell Inc.</td>
<td>Software Availability:</td>
<td>Apr-2020</td>
</tr>
</tbody>
</table>

**Platform Notes (Continued)**

```plaintext
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.1 (Ootpa)"
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.1:ga

uname -a:
Linux localhost.localdomain 4.18.0-147.el8.x86_64 #1 SMP Thu Sep 26 15:52:44 UTC 2019
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

- CVE-2018-3620 (L1 Terminal Fault): Not affected
- Microarchitectural Data Sampling: Not affected
- CVE-2017-5754 (Meltdown): Not affected
- CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
- CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swapgs barriers and __user pointer sanitization
- CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

run-level 3 Jun 23 14:07

SPEC is set to: /dev/shm/cpu2017-ic19.1u1

From /sys/devices/virtual/dmi/id
BIOS: Dell Inc. 2.7.3 03/25/2020
Vendor: Dell Inc.
Product: PowerEdge C6420
Product Family: PowerEdge

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.

Memory:
- 6x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
- 1x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
- 2x 00AD063200AD HMA84GR7CJR4N-XN 32 GB 2 rank 3200
- 3x 00AD069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
- 4x Not Specified Not Specified

(End of data from sysinfo program)
# Dell Inc.

**PowerEdge C6420 (Intel Xeon Gold 6248R, 3.00 GHz)**

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<td>Tested by:</td>
<td>Dell Inc.</td>
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## Compiler Version Notes

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

Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
```

```
C
| 600.perlbench_s(peak) |

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
```

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

Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
```

```
C
| 600.perlbench_s(peak) |

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 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++ Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
```

```
Fortran
| 648.exchange2_s(base, peak) |

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
```

(Continued on next page)
Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 6248R, 3.00 GHz)

SPECspeed®2017_int_base = 11.1
SPECspeed®2017_int_peak = 11.4

CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: May-2020
Hardware Availability: Feb-2020
Tested by: Dell Inc.
Software Availability: Apr-2020

Compiler Version Notes (Continued)
64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
________________________________________

Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

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:
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs 
-xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops 
-fuse-ld=gold -qopt-mem-layout-trans=4 -fopenmp -DSPEC_OPENMP 
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

C++ benchmarks:
-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries 
-Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse 
-funroll-loops -fuse-ld=gold -qopt-mem-layout-trans=4

(Continued on next page)
### Base Optimization Flags (Continued)

C++ benchmarks (continued):
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin`
- `-lqkmalloc`

Fortran benchmarks:
- `-m64 `-Wl,-plugin-opt=-x86-branches-within-32B-boundaries `-xCORE-AVX512`
- `-O3 `-ipo `-no-prec-div `-qopt-mem-layout-trans=4`
- `-nostandard-realloc-lhs `-align array32byte`
- `-mbranches-within-32B-boundaries`

### Peak Compiler Invocation

C benchmarks:
- `icc`

C++ benchmarks:
- `icpc`

Fortran benchmarks:
- `ifort`

### Peak Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
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<tr>
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<td><code>-DSPEC_LP64 </code>-DSPEC_LINUX_X64</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td><code>-DSPEC_LP64(*) </code>-DSPEC_LP64</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td><code>-DSPEC_LP64</code></td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td><code>-DSPEC_LP64</code></td>
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<tr>
<td>623.xalancbmk_s</td>
<td><code>-DSPEC_LP64 </code>-DSPEC_LINUX</td>
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<tr>
<td>625.x264_s</td>
<td><code>-DSPEC_LP64</code></td>
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<tr>
<td>631.deepsjeng_s</td>
<td><code>-DSPEC_LP64</code></td>
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<td>641.leela_s</td>
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<tr>
<td>648.exchange2_s</td>
<td><code>-DSPEC_LP64</code></td>
</tr>
<tr>
<td>657.xz_s</td>
<td><code>-DSPEC_LP64</code></td>
</tr>
</tbody>
</table>

(*) Indicates a portability flag that was found in a non-portability variable.

### Peak Optimization Flags

C benchmarks:

(Continued on next page)
Dell Inc. PowerEdge C6420 (Intel Xeon Gold 6248R, 3.00 GHz) SPECspeed\textsuperscript{®}2017\_int\_base = 11.1

SPECspeed\textsuperscript{®}2017\_int\_peak = 11.4

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.
Test Date: May-2020
Hardware Availability: Feb-2020
Software Availability: Apr-2020

Peak Optimization Flags (Continued)

600.perlbench\_s: -Wl, -z, muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-strict-overflow
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

602.gcc\_s: -m64 -qnextgen -std=c11 -fuse-ld=gold
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z, muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdatal -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

605.mcf\_s: basepeak = yes

625.x264\_s: -m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z, muldefs -xCORE-AVX512 -flto -O3 -ffast-math
-fuse-ld=gold -qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

657.xz\_s: basepeak = yes

C++ benchmarks:

620.omnetpp\_s: basepeak = yes

623.xalancbmk\_s: basepeak = yes

631.deepsjeng\_s: basepeak = yes

641.leela\_s: basepeak = yes

Fortran benchmarks:

648.exchange2\_s: basepeak = yes

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:

http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml
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<th>SPEC CPU®2017 Integer Speed Result</th>
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<td><strong>Dell Inc.</strong></td>
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<tr>
<td>PowerEdge C6420 (Intel Xeon Gold 6248R, 3.00 GHz)</td>
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<tr>
<td>SPECspeed®2017_int_peak = 11.4</td>
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</table>

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

**Test Date:** May-2020

**Hardware Availability:** Feb-2020

**Software Availability:** Apr-2020

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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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