## SPEC CPU®2017 Integer Rate Result

**Dell Inc.**

**PowerEdge C6420 (Intel Xeon Gold 6258R, 2.70 GHz)**

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<tr>
<th>Copies</th>
<th>SPECrate®2017_int_base = 304</th>
<th>SPECrate®2017_int_peak = 317</th>
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<td>226</td>
<td>258</td>
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<tr>
<td>502.gcc_r 112</td>
<td>249</td>
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<td>505.mcf_r 112</td>
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<tr>
<td>520.omnetpp_r 112</td>
<td>198</td>
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<tr>
<td>523.xalancbmk_r 112</td>
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<td>SPECrate®2017_int_base (304)</td>
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### Hardware
- **CPU Name:** Intel Xeon Gold 6258R
- **Max MHz:** 4000
- **Nominal:** 2700
- **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 2Rx8 PC4-2933V-R, running at 2933)
- **Storage:** 1 x 960 GB SATA SSD
- **Other:** None

### Software
- **OS:** Red Hat Enterprise Linux release 8.1
- **Compiler:** C/C++: Version 19.0.5.281 of Intel C/C++ Compiler for Linux;
  Fortran: Version 19.0.5.281 of Intel Fortran Compiler for Linux
- **Parallel:** No
- **Firmware:** Version 2.7.3 released Mar-2020
- **File System:** xfs
- **System State:** Run level 5 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 32/64-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 6258R, 2.70 GHz)

SPECrat®2017_int_base = 304
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Results Table

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SPECrat®2017_int_base = 304
SPECrat®2017_int_peak = 317

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"

Environment Variables Notes
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = 
"/home/cpu2017/lib/intel64:/home/cpu2017/lib/ia32:/home/cpu2017/jre5.0.1-32"

MALLOCONF = "retain:true"

General Notes
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.

(Continued on next page)
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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Apr-2020  
**Hardware Availability:** Feb-2020  
**Software Availability:** Jun-2020  

## General Notes (Continued)

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.:

```
umactl --interleave=all runcpu <etc>
```

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:
  - 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
  - Memory Patrol Scrub set to standard
  - Logical Processor enabled
  - CPU Interconnect Bus Link Power Management enabled
  - PCI ASPM L1 Link Power Management enabled

- Sysinfo program /home/cpu2017/bin/sysinfo
  
- Rev: r6365 of 2019-08-21 295195f888a3d7ed1e6e46a485a0011
  running on localhost.localdomain Sun Apr 12 15:02:15 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

- From /proc/cpuinfo
  
  model name : Intel(R) Xeon(R) Gold 6258R CPU @ 2.70GHz
  
  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

(Continued on next page)
Platform Notes (Continued)

physical 1: cores 0 1 2 3 4 5 6 7 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
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) Gold 6258R CPU @ 2.70GHz
Stepping: 7
CPU MHz: 3291.057
CPU max MHz: 4000.0000
CPU min MHz: 1000.0000
BogoMIPS: 5400.00
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 pdpe1gb rdtsscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl apicreation msx datatopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrouter pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnopprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_pmm ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmorbit ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invvpidd rtm cqm mp xdn rdt_a avx512f avx512dq rodseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xGetBv1 xsaves cqm_llc cqm_occupp_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_lld arch_capabilities

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

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

Platform Notes (Continued)

/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: 95303 MB
   node 0 free: 93626 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: 96762 MB
   node 1 free: 96499 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: 96737 MB
   node 2 free: 94394 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: 96502 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:       394818684 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"
      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)

(Continued on next page)
Platform Notes (Continued)

```
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 5 Apr 12 13:26

SPEC is set to: /home/cpu2017
    Filesystem            Type  Size  Used Avail Use% Mounted on
    /dev/mapper/rhel-home xfs   876G   22G  854G   3% /home

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 00AD0063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
    2x 00AD003200AD HMA84GR7CJR4N-XN 32 GB 2 rank 3200
    3x 00AD0069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
    4x Not Specified Not Specified

(End of data from sysinfo program)
```
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Compiler Version Notes

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Intel (R) C++ Compiler for applications running on Intel(R) 64, Version 19.0.5 NextGen Technology Build 20190729

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**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.

**Base Compiler Invocation**

- **C benchmarks:** icc
- **C++ benchmarks:** icpc
- **Fortran benchmarks:** ifort

**Base Portability Flags**

- `500.perlbench_r`: `-DSPEC_LP64 -DSPEC_LINUX_X64`
- `502.gcc_r`: `-DSPEC_LP64`
- `505.mcf_r`: `-DSPEC_LP64`
- `520.omnetpp_r`: `-DSPEC_LP64`
- `523.xalancbmk_r`: `-DSPEC_LP64 -DSPEC_LINUX`
- `525.x264_r`: `-DSPEC_LP64`
- `531.deepsjeng_r`: `-DSPEC_LP64`
- `541.leela_r`: `-DSPEC_LP64`
- `548.exchange2_r`: `-DSPEC_LP64`
- `557.xz_r`: `-DSPEC_LP64`

**Base Optimization Flags**

- **C benchmarks:**
  - `-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -flto`
  - `-mfpmath=sse -funroll-loops -qnextgen -fuse-ld=gold`
  - `-qopt-mem-layout-trans=4`
  - `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin`
  - `-lqkmalloc`

- **C++ benchmarks:**
  - `-m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -flto -mfpmath=sse`
  - `-funroll-loops -qnextgen -fuse-ld=gold -qopt-mem-layout-trans=4`
  - `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin`
  - `-lqkmalloc`

- **Fortran benchmarks:**
  - `-m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div`
  - `-qopt-mem-layout-trans=4 -nostandard-realloc-lhs`
  - `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin`
  - `-lqkmalloc`
## SPEC CPU®2017 Integer Rate Result

### Dell Inc.
PowerEdge C6420 (Intel Xeon Gold 6258R, 2.70 GHz)

| SPECrate®2017_int_base | 304 |
| SPECrate®2017_int_peak | 317 |

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

### Peak Compiler Invocation

- **C benchmarks:** 
  - icc
- **C++ benchmarks:** 
  - icpc
- **Fortran benchmarks:** 
  - ifort

### Peak Portability Flags

- 500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
- 502.gcc_r: -D_FILE_OFFSET_BITS=64
- 505.mcf_r: -DSPEC_LP64
- 520.omnetpp_r: -DSPEC_LP64
- 523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
- 525.x264_r: -DSPEC_LP64
- 531.deepsjeng_r: -DSPEC_LP64
- 541.leela_r: -DSPEC_LP64
- 548.exchange2_r: -DSPEC_LP64
- 557.xz_r: -DSPEC_LP64

### Peak Optimization Flags

- **C benchmarks:** 
  - 500.perlbench_r: -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 
  - -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin -lqkmalloc
  - 502.gcc_r: -m32 
  - -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/ia32_lin 
  - -std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass 1) 
  - -fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto 
  - -Ofast(pass 1) -O3 -ffast-math -qnextgen -fuse-ld=gold 
  - -qopt-mem-layout-trans=4 -L/usr/local/je5.0.1-32/lib -ljemalloc
  - 505.mcf_r: basepeak = yes

(Continued on next page)
Dell Inc. PowerEdge C6420 (Intel Xeon Gold 6258R, 2.70 GHz)

SPECrate®2017_int_base = 304
SPECrate®2017_int_peak = 317

Peak Optimization Flags (Continued)

525.x264_r: -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -flto -O3
-ffast-math -qnextgen -fuse-ld=gold
-qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin
-lqkmalloc

557.xz_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin
-lqkmalloc

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbmk_r: basepeak = yes

531.deepsjeng_r: -m64 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.proftdata(pass 2) -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -qnextgen -fuse-ld=gold
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin
-lqkmalloc

541.leela_r: basepeak = yes

Fortran benchmarks:

548.exchange2_r: 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-ic19.0u5-official-linux64_rev0.xml

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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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