## SPEC CPU®2017 Integer Rate Result

### Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 6246R, 3.40 GHz)

**SPECrate®2017_int_base = 222**  
**SPECrate®2017_int_peak = 229**

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

- **CPU Name:** Intel Xeon Gold 6246R  
  - Max MHz: 4100  
  - Nominal: 3400  
  - Enabled: 32 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 chip  
  - Other: None  
  - Memory: 384 GB (12 x 32 GB 2Rx8 PC4-2933V-R, running at 2933)  
  - Storage: 1 x 480 GB SATA SSD  
  - Other: None

### Software

- **OS:** CentOS Linux 8.1.1911  
  - kernel 4.18.0-147.5.1.el8_1.x86_64  
- **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:** tmpfs  
- **System State:** Run level 3 (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

### Copies

<table>
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<tr>
<th>Program</th>
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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 =
"/dev/shm/cpu2017/lib/intel64:/dev/shm/cpu2017/lib/ia32:/dev/shm/cpu2017/je5.0.1-32"
MALLOC_CONF = "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.
**Dell Inc.**  
PowerEdge C6420 (Intel Xeon Gold 6246R, 3.40 GHz)

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

### 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.:
```
numactl --interleave=all runcpu <etc>
```


### 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 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/bin/sysinfo  
Rev: r6365 of 2019-08-21 295195f888a3d7ed1e6e46a485a0011  
running on localhost.localdomain Mon Apr 27 22:30:45 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 6246R CPU @ 3.40GHz
  2 "physical id"s (chips)
  64 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
```

(Continued on next page)
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Platform Notes (Continued)

cpu cores : 16
siblings : 32
physical 0: cores 0 1 2 6 12 13 16 17 18 19 21 25 26 27 28 29
physical 1: cores 0 1 2 3 4 5 6 13 16 17 18 19 21 24 28 29

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 2
Core(s) per socket: 16
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6246R CPU @ 3.40GHz
Stepping: 7
CPU MHz: 1989.150
CPU max MHz: 4100.0000
CPU min MHz: 1200.0000
BogoMIPS: 6800.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s): 0,4,6,12,16,20,24,28,32,36,38,44,48,52,56,60
NUMA node1 CPU(s): 1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61
NUMA node2 CPU(s): 2,8,10,14,18,22,26,30,34,40,42,46,50,54,58,62
NUMA node3 CPU(s): 3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 cflsh dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdopgb 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
xtrpr pdcm pccd dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
invpcid_single intel_pcin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invvpid 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_mmb_total
cqm_mmb_local dtherm ida arat pln pts pkup ospke avx512_vnni md_clear flush_l1d
arch_capabilities

/proc/cpuinfo cache data

(Continued on next page)
Platform Notes (Continued)

From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a physical chip.

available: 4 nodes (0-3)
node 0 cpu: 0 4 6 12 16 20 24 28 32 36 38 44 48 52 56 60
node 0 size: 95305 MB
node 0 free: 95124 MB
node 1 cpu: 1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61
node 1 size: 96764 MB
node 1 free: 95992 MB
node 2 cpu: 2 8 10 14 18 22 26 30 34 40 42 46 50 54 58 62
node 2 size: 96764 MB
node 2 free: 80961 MB
node 3 cpu: 3 7 11 15 19 23 27 31 35 39 43 47 51 55 59 63
node 3 size: 96738 MB
node 3 free: 96431 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: 394827724 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release*/etc/*version*
centos-release: CentOS Linux release 8.1.1911 (Core)
centos-release-upstream: Derived from Red Hat Enterprise Linux 8.1 (Source)

uname -a:
Linux localhost.localdomain 4.18.0-147.5.1.el8_1.x86_64 #1 SMP Wed Feb 5 02:00:39 UTC

(Continued on next page)
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Platform Notes (Continued)

2020 x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

- itlb_multihit: Processor vulnerable
- 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
- tsx_async_abort: Mitigation: Clear CPU buffers; SMT vulnerable

run-level 3 Apr 27 17:02

SPEC is set to: /dev/shm/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 189G 7.6G 181G 4% /dev/shm

From /sys/devices/virtual/dmi/id
BIOS: Dell Inc. 2.7.3 03/25/2020
Vendor: Dell Inc.
Product: PowerEdge C6420
Product Family: PowerEdge
Serial: 1234567

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:
- 8x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
- 1x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
- 3x 00AD069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
- 4x Not Specified Not Specified

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
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<th>C</th>
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Compiler Version Notes (Continued)

Intel(R) C Compiler for applications running on IA-32, Version 19.0.5 NextGen Technology Build 20190729  
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**Base Compiler Invocation**

C benchmarks:

icc

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### Base Compiler Invocation (Continued)

C++ benchmarks:
- icpc

Fortran benchmarks:
- ifort

### Base Portability Flags

- perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
- gcc_r: -DSPEC_LP64
- mcf_r: -DSPEC_LP64
- omnetpp_r: -DSPEC_LP64
- xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
- x264_r: -DSPEC_LP64
- deepsjeng_r: -DSPEC_LP64
- leela_r: -DSPEC_LP64
- 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 6246R, 3.40 GHz)

SPECrate®2017_int_base = 222
SPECrate®2017_int_peak = 229

Available online or by emailing info@spec.org

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

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

(Continued on next page)

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 6246R, 3.40 GHz)  

| SPECrate®2017_int_base = 222 |
| SPECrate®2017_int_peak = 229 |

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

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

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.profdatalpass 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.

Tested with SPEC CPU®2017 v1.1.0 on 2020-04-27 22:30:44-0400.  