## SPEC CPU®2017 Integer Rate Result

**Dell Inc.**

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

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

| SPECrate®2017_int_base | 250 |
| SPECrate®2017_int_peak | 260 |

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

### 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 (10 x 32 GB 2Rx4 PC4-2933Y-R; 2 x 32 GB 2Rx4 PC4-3200AA-R, running at 2933)  
- **Storage:** 1 x 960 GB 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:** 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

---

#### SPEC CPU®2017 Rate Test Results

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<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>SPECrate®2017_int_base</th>
<th>SPECrate®2017_int_peak</th>
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Dell Inc.

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

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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:
LD_LIBRARY_PATH = 
   
MALLOC_CONF = "retain:true"
SPEC CPU®2017 Integer Rate Result

Dell Inc.

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

SPECrate®2017_int_base = 250
SPECrate®2017_int_peak = 260

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

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"
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 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 295195f888a3d7edbb1e6e46a485a0011
running on localhost.localdomain Thu Jul 16 15:11:13 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)
### Platform Notes (Continued)

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.)
cpu cores : 16
siblings : 32
  physical 0: cores 0 1 2 3 4 5 6 13 16 17 18 19 21 24 28 29
  physical 1: cores 0 1 2 6 12 13 16 17 18 19 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):              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:             2102.907
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):   0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60
NUMA node1 CPU(s):   1,5,7,13,17,21,25,29,33,37,39,45,49,53,57,61
NUMA node2 CPU(s):   2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62
NUMA node3 CPU(s):   3,9,11,15,19,23,27,31,35,41,43,47,51,55,59,63
Flags:               fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dts acpi mmx fxsr sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc 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 xtrunc pdcm 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 cpe invpcid_single intel_pinn ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
```

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

Dell Inc.

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

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

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

SPECrater®2017_int_base = 250
SPECrater®2017_int_peak = 260

Platform Notes (Continued)

flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
avx512bw avx512vl xsaveopt xsaves cqm_llc cqm_occup_llc cqm_mbm_total
cqm_mbm_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
node 0 size: 95280 MB
node 0 free: 94960 MB
node 1 cpus: 1 5 7 13 17 21 25 29 33 37 39 45 49 53 57 61
node 1 size: 96764 MB
node 1 free: 95683 MB
node 2 cpus: 2 6 10 14 18 22 26 30 34 38 42 46 50 54 58 62
node 2 size: 96764 MB
node 2 free: 96007 MB
node 3 cpus: 3 9 11 15 19 23 27 31 35 41 43 47 51 55 59 63
node 3 size: 96764 MB
node 3 free: 87996 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*
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)

(Continued on next page)
## Dell Inc.

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

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</tr>
</tbody>
</table>

### SPECrate®2017_int_base = 250

### SPECrate®2017_int_peak = 260

#### Platform Notes (Continued)

- 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 Jul 16 15:08
SPEC is set to: /dev/shm/cpu2017-ic19.1u1
```

```
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<td>4.2G</td>
<td>185G</td>
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<td>/dev/shm</td>
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</tbody>
</table>
```

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 00ADO0B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
- 1x 00ADO63200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
- 2x 00ADO63200AD HMA84GR7CJR4N-XN 32 GB 2 rank 3200
- 3x 00ADO69D000AD 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 6246R, 3.40 GHz)  

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<th>502.gcc_r(peak)</th>
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| Intel(R) C Compiler for applications running on IA-32, Version 2021.1 NextGen Build 20200304  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |

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Version 19.1.1.217 Build 20200306  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |

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(Continued on next page)
**Compiler Version Notes (Continued)**

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Dell Inc.

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

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**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
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548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

(Continued on next page)

**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 -fto -msmpath=sse -funroll-loops
-fuse-ld=gold -qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc

C++ benchmarks:
-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -fto -msmpath=sse
-funroll-loops -fuse-ld=gold -qopt-mem-layout-trans=4
-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 -Wl,-z,muldefs
-xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4

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

Dell Inc.

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

SPECrate®2017_int_base = 250
SPECrate®2017_int_peak = 260

<table>
<thead>
<tr>
<th>CPU2017 License: 55</th>
<th>Test Date: Jul-2020</th>
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**Base Optimization Flags (Continued)**

Fortran benchmarks (continued):
- nostandard-realloc-lhs -align array32byte -auto
- mbranches-within-32B-boundaries
- L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
  -lqkmalloc

**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 -03 -no-prec-div
-qopt-mem-layout-trans=4 -fno-strict-overflow
-mbranches-within-32B-boundaries
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
  -lqkmalloc

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

Dell Inc.

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

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Peak Optimization Flags (Continued)

502.gcc_r: -m32
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/ia32_lin
-std=gnu89
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
-O3 -fno-alias -fuse-ld=gold
-oqopt-mem-layout-trans=4 -L/usr/local/jemalloc32-5.0.1/lib
-ljemalloc

505.mcf_r: basepeak = yes

525.x264_r: -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/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc

557.xz_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbmk_r: basepeak = yes

531.deepsjeng_r: basepeak = yes

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
### SPEC CPU®2017 Integer Rate Result

**Dell Inc.**

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

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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.

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