### Dell Inc.

PowerEdge C6420 (Intel Xeon Silver 4210R, 2.40 GHz)

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</tr>
<tr>
<td>557.xz_r</td>
<td>73.2</td>
<td>74.4</td>
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</table>

#### Hardware
- **CPU Name:** Intel Xeon Silver 4210R
- **Max MHz:** 3200
- **Nominal:** 2400
- **Enabled:** 20 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:** 13.75 MB I+D on chip per chip
- **Other:** None
- **Memory:** 384 GB (12 x 32 GB 2Rx8 PC4-2933V-R, running at 2400)
- **Storage:** 1 x 480 GB SATA SSD
- **Other:** None

#### Software
- **OS:** Red Hat Enterprise Linux release 8.1 kernel 4.18.0-147.el8.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
Dell Inc.
PowerEdge C6420 (Intel Xeon Silver 4210R, 2.40 GHz)

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

Results Table

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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"
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.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)
## SPEC CPU®2017 Integer Rate Result

**Dell Inc.**  
PowerEdge C6420 (Intel Xeon Silver 4210R, 2.40 GHz)

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### General Notes (Continued)

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>  
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:  
Virtualization Technology disabled  
DCU Streamer Prefetcher 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 disabled  
Logical Processor enabled  
CPU Interconnect Bus L1 Link Power Management enabled  
PCI ASPM L1 Link Power Management enabled

Sysinfo program /dev/shm/cpu2017/bin/sysinfo  
Rev: r6365 of 2019-08-21 295195f888a3d7ed81e6e46a485a0011  
running on localhost.localdomain Tue Apr 21 16:33:45 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) Silver 4210R CPU @ 2.40GHz
  2 "physical id"s (chips)
  40 "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 : 10
siblings : 20
physical 0: cores 0 1 2 3 4 8 9 10 11 12
physical 1: cores 0 1 2 3 4 8 9 10 11 12
```

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

## Dell Inc.

PowerEdge C6420 (Intel Xeon Silver 4210R, 2.40 GHz)

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### Platform Notes (Continued)

From `lscpu`:

- **Architecture:** x86_64
- **CPU op-mode(s):** 32-bit, 64-bit
- **Byte Order:** Little Endian
- **CPU(s):** 40
- **On-line CPU(s) list:** 0-39
- **Thread(s) per core:** 2
- **Core(s) per socket:** 10
- **Socket(s):** 2
- **NUMA node(s):** 2
- **Vendor ID:** GenuineIntel
- **CPU family:** 6
- **Model:** 85
- **Model name:** Intel(R) Xeon(R) Silver 4210R CPU @ 2.40GHz
- **Stepping:** 7
- **CPU MHz:** 1494.579
- **CPU max MHz:** 3200.0000
- **CPU min MHz:** 1000.0000
- **BogoMIPS:** 4800.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 14808K
- **NUMA node0 CPU(s):** 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38
- **NUMA node1 CPU(s):** 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39
- **Flags:** fpu vme de pse tsc msr pae mce cx8 apic sep 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 aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr 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_pinn ssbd mbx ibrs ibpb ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ets invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occsvg_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d arch_capabilities

```
/cache data
```

From `numactl --hardware`

**WARNING:** a numactl 'node' might or might not correspond to a physical chip.

- **available:** 2 nodes (0-1)
  - node 0 cpus: 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38
  - node 0 size: 192073 MB

(Continued on next page)
Dell Inc.
PowerEdge C6420 (Intel Xeon Silver 4210R, 2.40 GHz)

SPEC CPU®2017 Integer Rate Result
Copyright 2017-2020 Standard Performance Evaluation Corporation

SPECrate®2017_int_base = 119
SPECrate®2017_int_peak = 123

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

Test Date: Apr-2020
Hardware Availability: Feb-2020
Software Availability: Nov-2019

Platform Notes (Continued)

node 0 free: 183930 MB
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39
node 1 size: 193505 MB
node 1 free: 184684 MB
node distances:
node 0 1
  0:  10 21
  1:  21 10

From /proc/meminfo
MemTotal:       394832916 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)
  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 Apr 21 16:15
SPEC is set to: /dev/shm/cpu2017

(Continued on next page)
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### Platform Notes (Continued)

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<td>7.6G</td>
<td>181G</td>
<td>5%</td>
<td>/dev/shm</td>
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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)*

## Compiler Version Notes

```plaintext
C       | 502.gcc_r(peak)
-------------------------------
Intel(R) C Compiler for applications running on IA-32, Version 19.0.5 NextGen Technology Build 20190729
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
```

```plaintext
C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
| 525.x264_r(base, peak) 557.xz_r(base)
-------------------------------
Intel(R) C Compiler for applications running on Intel(R) 64, Version 19.0.5 NextGen Technology Build 20190729
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
```

```plaintext
C       | 500.perlbench_r(peak) 557.xz_r(peak)
-------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.5.281 Build 20190815
```

*(Continued on next page)*
## Dell Inc.

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### Compiler Version Notes (Continued)

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</tr>
</thead>
<tbody>
<tr>
<td>Intel(R) C Compiler for applications running on Intel(R) 64, Version 19.0.5 NextGen Technology Build 20190729</td>
<td></td>
</tr>
<tr>
<td>Copyright (C) 1985-2019 Intel Corporation. All rights reserved.</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>C</th>
<th>500.perlbench_r(peak) 557.xz_r(peak)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Continued on next page)</td>
<td></td>
</tr>
</tbody>
</table>
**Compiler Version Notes (Continued)**

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
C++ | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak)
    | 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 19.0.5
NextGen Technology Build 20190729
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
==============================================================================
Fortran | 548.exchange2_r(base, peak)
==============================================================================
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

**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

(Continued on next page)
### Baseline Portability Flags (Continued)

541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

### Baseline 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
  -Iqkmalloc

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
  -Iqkmalloc

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
  -Iqkmalloc

### Peak Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

### Peak Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64

(Continued on next page)
Dell Inc.
PowerEdge C6420 (Intel Xeon Silver 4210R, 2.40 GHz)

SPECrate®2017_int_base = 119
SPECrate®2017_int_peak = 123

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

Test Date: Apr-2020
Hardware Availability: Feb-2020
Software Availability: Nov-2019

Peak Portability Flags (Continued)

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

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:

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

**Dell Inc.**

PowerEdge C6420 (Intel Xeon Silver 4210R, 2.40 GHz)

| SPECrate®2017_int_base = 119 |
| SPECrate®2017_int_peak = 123 |

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

| Test Date: Apr-2020 |
| Hardware Availability: Feb-2020 |
| Software Availability: Nov-2019 |

### Peak Optimization Flags (Continued)

520.omnetpp_r: basepeak = yes

523.xalancbmk_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:


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 CPU® 2017 v1.1.0 on 2020-04-21 16:33:44-0400.  
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