### Dell Inc.

**PowerEdge C6420 (Intel Xeon Gold 6240R, 2.40 GHz)**

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

<table>
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<tr>
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<td>96</td>
<td>186</td>
<td></td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon Gold 6240R  
- **Max MHz:** 4000  
- **Nominal:** 2400  
- **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 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 8.1  
- **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
### Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 6240R, 2.40 GHz)

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<td>182</td>
<td>96</td>
<td>558</td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

### 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 = 
  
"/dev/shm/cpu2017-ic19.1u1/lib/intel64:/dev/shm/cpu2017-ic19.1u1/lib/ia32:/dev/shm/cpu2017-ic19.1u1/je5.0.1-32"

MALLOC_CONF = "retain:true"
```
Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 6240R, 2.40 GHz)

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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)
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:
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

Sysinfo program /dev/shm/cpu2017-ic19.1u1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edblaee6464a485a0011
running on localhost.localdomain Tue May 19 13:42:47 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 6240R CPU @ 2.40GHz
  2 "physical id"s (chips)
  96 "processors"

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

## Dell Inc.

### PowerEdge C6420 (Intel Xeon Gold 6240R, 2.40 GHz)

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### Platform Notes (Continued)

```
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 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
physical 1: 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
```

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 6240R CPU @ 2.40GHz
- **Stepping:** 7
- **CPU MHz:** 2255.118
- **CPU max MHz:** 4000.000
- **CPU min MHz:** 1000.000
- **BogoMIPS:** 4800.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 36608K
- **NUMA node0 CPU(s):** 0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60,64,68,72,76,78,80,84,88,92
- **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
- **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
- **NUMA node3 CPU(s):** 3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63,67,71,75,79,83,87,91,95
- **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 dts tsc xlev scsbl tsc cmov lmx constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperf perf pni pclmulqdq dtes64 monitor ds_cpl vmx 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 cld invpvp icid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmci flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm

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

**PowerEdge C6420 (Intel Xeon Gold 6240R, 2.40 GHz)**

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### Platform Notes (Continued)

```plaintext
spec
```

**cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
avx512bw avx512vl xsaveopt xsavc xgetbv1 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
```

```
p/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: 95087 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: 96763 MB
node 1 free: 85558 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: 96737 MB
node 2 free: 96347 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: 96593 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"
  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)
Dell Inc. PowerEdge C6420 (Intel Xeon Gold 6240R, 2.40 GHz) SPECrate®2017_int_base = 301
SPECrate®2017_int_peak = 313

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

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 3 May 19 11:32
SPEC is set to: /dev/shm/cpu2017-ic19.1u1
    Filesystem     Type    Size  Used  Avail  Use% Mounted on
    tmpfs           tmpfs   189G  4.2G  185G   3% /dev/shm

From /sysdevices/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 6240R, 2.40 GHz)

SPECRate®2017_int_base = 301
SPECRate®2017_int_peak = 313

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

Compiler Version Notes

==============================================================================
C       | 502.gcc_r(peak)
------------------------------------------------------------------------------
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.
------------------------------------------------------------------------------

==============================================================================
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 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C       | 500.perlbench_r(peak) 557.xz_r(peak)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C       | 502.gcc_r(peak)
------------------------------------------------------------------------------
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.
------------------------------------------------------------------------------

==============================================================================
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 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C       | 500.perlbench_r(peak) 557.xz_r(peak)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.1.1.217 Build 20200306
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(Continued on next page)
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## Compiler Version Notes (Continued)

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---

### C

| 502.gcc_r(peak) |

Intel(R) C Compiler for applications running on IA-32, Version 2021.1 NextGen Build 20200304

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---

### 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 2021.1 NextGen Build 20200304

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---

### C

| 500.perlbench_r(peak) 557.xz_r(peak) |

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306

Copyright (C) 1985-2020 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 2021.1 NextGen Build 20200304

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---

### Fortran

| 548.exchange2_r(base, peak) |

Intel(R) Fortran 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.
## SPEC CPU®2017 Integer Rate Result

**Dell Inc.**  
PowerEdge C6420 (Intel Xeon Gold 6240R, 2.40 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  
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 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -O3 -ffast-math -ftlo -mfpmath=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 -ftlo -mfpmath=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 6240R, 2.40 GHz)

SPECrate®2017_int_base = 301
SPECrate®2017_int_peak = 313

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

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.perlb benchmark_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: -W1, -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)
## 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  
-Ofast(pass 1) -O3 -ffast-math -qnextgen -fuse-ld=gold  
-qopt-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 6240R, 2.40 GHz)

<table>
<thead>
<tr>
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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** May-2020  
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You can also download the XML flags sources by saving the following links:


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