### Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 6242R, 3.10GHz)

<table>
<thead>
<tr>
<th>Test Sponsor</th>
<th>Dell Inc.</th>
</tr>
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<tbody>
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<td>Test Date</td>
<td>Jul-2020</td>
</tr>
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<td>Hardware Availability</td>
<td>Feb-2020</td>
</tr>
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<td>Apr-2020</td>
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</tbody>
</table>

#### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Spec2017_fp_base</th>
<th>Spec2017_fp_peak</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>40</td>
<td>168</td>
<td>168</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>40</td>
<td>97.5</td>
<td>97.5</td>
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<tr>
<td>619.lbm_s</td>
<td>40</td>
<td>132</td>
<td>132</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>40</td>
<td>106</td>
<td>106</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>40</td>
<td>72.2</td>
<td>72.2</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>40</td>
<td>142</td>
<td>142</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>40</td>
<td>88.7</td>
<td>88.7</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>40</td>
<td>268</td>
<td>268</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>40</td>
<td>141</td>
<td>141</td>
</tr>
</tbody>
</table>

#### Hardware

- **CPU Name**: Intel Xeon Gold 6242R
- **Max MHz**: 4100
- **Nominal**: 3100
- **Enabled**: 40 cores, 2 chips
- **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
- **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**: Yes
- **Firmware**: Version 2.7.3 released Mar-2020
- **File System**: tmpfs
- **System State**: Run level 3 (multi-user)
- **Base Pointers**: 64-bit
- **Peak Pointers**: 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 6242R, 3.10GHz)  

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<tr>
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<td>114</td>
<td>517</td>
<td><strong>114</strong></td>
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<td>115</td>
<td>512</td>
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<td></td>
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<td></td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>40</td>
<td>95.8</td>
<td>174</td>
<td>99.6</td>
<td>167</td>
<td><strong>99.0</strong></td>
<td><strong>168</strong></td>
<td>95.8</td>
<td>174</td>
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<td><strong>97.5</strong></td>
<td>55.0</td>
<td>95.3</td>
<td>52.9</td>
<td>99.1</td>
<td>40</td>
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<td><strong>97.5</strong></td>
<td>55.0</td>
<td>95.3</td>
<td>52.9</td>
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<tr>
<td>621.wrf_s</td>
<td>40</td>
<td><strong>100</strong></td>
<td><strong>132</strong></td>
<td>100</td>
<td>132</td>
<td>100</td>
<td>132</td>
<td>40</td>
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<td>83.3</td>
<td>106</td>
<td><strong>83.5</strong></td>
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<td>83.6</td>
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<td>65.2</td>
<td>268</td>
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<td>268</td>
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<td>103</td>
<td>88.4</td>
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<td>88.5</td>
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<tr>
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<td>40</td>
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<td><strong>111</strong></td>
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<td>111</td>
<td>142</td>
<td>40</td>
<td>112</td>
<td>141</td>
<td><strong>111</strong></td>
<td><strong>141</strong></td>
<td>111</td>
</tr>
</tbody>
</table>

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:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = 
"/dev/shm/cpu2017-ic19.1u1/lib/intel64:/dev/shm/cpu2017-ic19.1u1/je5.0.1-64"
MALLOCONF = "retain:true"
OMP_STACKSIZE = "192M"

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)
Dell Inc.  
Pagenumber 3

PowerEdge C6420 (Intel Xeon Gold 6242R, 3.10GHz)

**General Notes (Continued)**

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 sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases

**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 disabled
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-ic19.1ul/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbe6e46a485a0011
running on localhost.localdomain Tue Jul 7 12:53:54 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 6242R CPU @ 3.10GHz
  2 "physical id"s (chips)
  40 "processors"

(Continued on next page)
## SPEC CPU®2017 Floating Point Speed Result

### Dell Inc.

**PowerEdge C6420 (Intel Xeon Gold 6242R, 3.10GHz)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>145</td>
<td>147</td>
</tr>
</tbody>
</table>

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

### 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**: 20
- **siblings**: 20
- **physical 0**: cores 0 1 2 4 5 6 8 9 10 11 12 13 16 17 18 19 21 26 28 29
- **physical 1**: cores 0 1 3 5 6 8 10 12 13 16 17 18 19 20 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)**: 40
- **On-line CPU(s) list**: 0-39
- **Thread(s) per core**: 1
- **Core(s) per socket**: 20
- **Socket(s)**: 2
- **NUMA node(s)**: 2
- **Vendor ID**: GenuineIntel
- **CPU family**: 6
- **Model**: 85
- **Model name**: Intel(R) Xeon(R) Gold 6242R CPU @ 3.10GHz
- **Stepping**: 7
- **CPU MHz**: 3626.371
- **CPU max MHz**: 4100.0000
- **CPU min MHz**: 1200.0000
- **BogoMIPS**: 6200.00
- **Virtualization**: VT-x
- **L1d cache**: 32K
- **L1i cache**: 32K
- **L2 cache**: 1024K
- **L3 cache**: 36608K
- **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 mtrr pge mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdelgb 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 abtm 3nowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_pcin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vni flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ets rsms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavefc xsaveprec xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d arch_capabilities

(Continued on next page)
Dell Inc. PowerEdge C6420 (Intel Xeon Gold 6242R, 3.10GHz)

**SPECspeed®2017_fp_base = 145**

**SPECspeed®2017_fp_peak = 147**

<table>
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Platform Notes (Continued)

```
cache size : 36608 KB

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: 192047 MB
node 0 free: 182248 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: 193531 MB
node 1 free: 193338 MB
node distances:
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: 192047 MB
node 0 free: 182248 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: 193531 MB
node 1 free: 193338 MB
node distances:
node 0: 10 21
node 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

(Continued on next page)
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.
PowerEdge C6420 (Intel Xeon Gold 6242R, 3.10GHz)  

SPECspeed®2017_fp_base = 145
SPECspeed®2017_fp_peak = 147

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

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

Platform Notes (Continued)

pointer sanitization
Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

run-level 3 Jul 7 12:27

SPEC is set to: /dev/shm/cpu2017-ic19.1ul

Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 189G 4.2G 185G 3% /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

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

==============================================================================
C               | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
| 644.nab_s(base, 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++, C, Fortran | 607.cactuBSSN_s(base, 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.

(Continued on next page)
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**SPECspeed®2017_fp_base = 145**  
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**Compiler Version Notes (Continued)**

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.

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.

Fortran  
603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)  
654.roms_s(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.

Fortran, C 621.wrf_s(base, peak) 627.cam4_s(base, peak)  
628.pop2_s(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.

---

**Base Compiler Invocation**

C benchmarks:  
icc

Fortran benchmarks:  
ifort

Benchmarks using both Fortran and C:  
ifort icc

Benchmarks using Fortran, C, and C++:  
icpc icc ifort
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 6242R, 3.10GHz)

SPECspeed®2017_fp_base = 145
SPECspeed®2017_fp_peak = 147

CPU2017 License: 55
Test Sponsor: Dell Inc.
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Test Date: Jul-2020
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Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
-assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -std=c11 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries

Fortran benchmarks:
-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div
-qpopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-nostandard-realloc-lhs -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using both Fortran and C:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qpopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using Fortran, C, and C++:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qpopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Peak Compiler Invocation

C benchmarks:
icc

(Continued on next page)
Peak Compiler Invocation (Continued)

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes
638.imagick_s: basepeak = yes

644.nab_s: -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP -mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:

603.bwaves_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs -mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

649.fotonik3d_s: Same as 603.bwaves_s

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

(Continued on next page)
Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 6242R, 3.10GHz)

SPECspeed®2017_fp_base = 145
SPECspeed®2017_fp_peak = 147

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

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

Peak Optimization Flags (Continued)

621.wrf_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
-prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

627.cam4_s: basepeak = yes
628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: 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-ic19.1u1-official-linux64_revA.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 2020-07-07 12:53:53-0400.
Report generated on 2020-08-04 14:36:02 by CPU2017 PDF formatter v6255.
Originally published on 2020-08-04.