Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 5218, 2.30GHz)

SPECspeed2017_fp_base = 112
SPECspeed2017_fp_peak = 112

Hardware

CPU Name: Intel Xeon Gold 5218
Max MHz.: 3900
Nominal: 2300
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: 22 MB I+D on chip per chip
Other: None
Memory: 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R, running at 2666)
Storage: 1 x 480 GB SATA SSD
Other: None

Software

OS: Ubuntu 18.04.2 LTS
kernel 4.15.0-45-generic
Compiler: C/C++: Version 19.0.1.144 of Intel C/C++ Compiler Build 20181018 for Linux;
Fortran: Version 19.0.1.144 of Intel Fortran Compiler Build 20181018 for Linux
Parallel: Yes
Firmware: Version 2.1.6 released Mar-2019
File System: ext4
System State: Run level 5 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
## Dell Inc.

**PowerEdge C6420 (Intel Xeon Gold 5218, 2.30GHz)**

<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>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Ratio</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
<td>131</td>
<td>449</td>
<td>130</td>
<td>453</td>
<td><strong>131</strong></td>
<td><strong>450</strong></td>
<td>64</td>
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<td><strong>445</strong></td>
<td>134</td>
<td>440</td>
<td>132</td>
<td>448</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>141</td>
<td>118</td>
<td>142</td>
<td>118</td>
<td><strong>142</strong></td>
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<td><strong>142</strong></td>
<td><strong>118</strong></td>
<td>141</td>
<td>118</td>
<td>142</td>
<td>117</td>
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<td>619.lbm_s</td>
<td>64</td>
<td>70.4</td>
<td>74.4</td>
<td>71.7</td>
<td>73.1</td>
<td><strong>71.2</strong></td>
<td><strong>73.6</strong></td>
<td>64</td>
<td>68.9</td>
<td>76.0</td>
<td>71.9</td>
<td>72.9</td>
<td><strong>69.2</strong></td>
<td><strong>75.7</strong></td>
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<tr>
<td>621.wrf_s</td>
<td>64</td>
<td>118</td>
<td>112</td>
<td>119</td>
<td>112</td>
<td><strong>118</strong></td>
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<td>627.cam4_s</td>
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<td>98.9</td>
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<td><strong>60.0</strong></td>
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<tr>
<td>638.imagick_s</td>
<td>64</td>
<td>176</td>
<td>82.1</td>
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<td>82.0</td>
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<tr>
<td>644.nab_s</td>
<td>64</td>
<td>91.1</td>
<td>192</td>
<td><strong>91.1</strong></td>
<td><strong>192</strong></td>
<td>91.2</td>
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<td>64</td>
<td>91.1</td>
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<td><strong>91.1</strong></td>
<td><strong>192</strong></td>
<td><strong>90.8</strong></td>
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<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
<td><strong>125</strong></td>
<td><strong>72.9</strong></td>
<td>125</td>
<td>73.0</td>
<td>125</td>
<td>72.9</td>
<td>64</td>
<td><strong>125</strong></td>
<td><strong>72.9</strong></td>
<td>125</td>
<td>72.7</td>
<td>125</td>
<td>73.0</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
<td>137</td>
<td>115</td>
<td><strong>138</strong></td>
<td><strong>114</strong></td>
<td>138</td>
<td>114</td>
<td>64</td>
<td>138</td>
<td>114</td>
<td><strong>138</strong></td>
<td><strong>114</strong></td>
<td>137</td>
<td>115</td>
</tr>
</tbody>
</table>

**SPECspeed2017_fp_base = 112**

**SPECspeed2017_fp_peak = 112**

### 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"

### General Notes

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH = ":/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64"
```

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>
```
Dell Inc.  
PowerEdge C6420 (Intel Xeon Gold 5218, 2.30GHz)

**SPEC CPU2017 Floating Point Speed Result**

**Dell Inc.**  
PowerEdge C6420 (Intel Xeon Gold 5218, 2.30GHz)

**SPECspeed2017_fp_base** = 112  
**SPECspeed2017_fp_peak** = 112

<table>
<thead>
<tr>
<th>CPU2017 License: 55</th>
<th>Test Date: Mar-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: Dell Inc.</td>
<td>Hardware Availability: Apr-2019</td>
</tr>
<tr>
<td>Tested by: Dell Inc.</td>
<td>Software Availability: Feb-2019</td>
</tr>
</tbody>
</table>

**Platform Notes**

BIOS settings:  
ADDDC setting disabled  
Virtualization Technology disabled  
Sub NUMA Cluster enabled  
DCU Streamer Prefetcher enabled  
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 Link Power Management disabled  
PCI ASPM L1 Link Power Management disabled  
Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9  
running on intel-sut Fri Mar 22 18:25:04 2019  

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 5218 CPU @ 2.30GHz  
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 7 8 9 10 11 12 13 14 15  
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

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

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

**PowerEdge C6420 (Intel Xeon Gold 5218, 2.30GHz)**

**SPEC CPU2017 Floating Point Speed Result**

- **CPU2017 License:** 55
- **Test Sponsor:** Dell Inc.
- **Tested by:** Dell Inc.
- **Test Date:** Mar-2019
- **Hardware Availability:** Apr-2019
- **Software Availability:** Feb-2019

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Model name: Intel(R) Xeon(R) Gold 5218 CPU @ 2.30GHz</td>
</tr>
<tr>
<td>Stepping: 6</td>
</tr>
<tr>
<td>CPU MHz: 3074.934</td>
</tr>
<tr>
<td>BogoMIPS: 4600.00</td>
</tr>
<tr>
<td>Virtualization: VT-x</td>
</tr>
<tr>
<td>L1d cache: 32K</td>
</tr>
<tr>
<td>L1i cache: 32K</td>
</tr>
<tr>
<td>L2 cache: 1024K</td>
</tr>
<tr>
<td>L3 cache: 22528K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s): 0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60</td>
</tr>
<tr>
<td>NUMA node1 CPU(s): 1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61</td>
</tr>
<tr>
<td>NUMA node2 CPU(s): 2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62</td>
</tr>
<tr>
<td>NUMA node3 CPU(s): 3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63</td>
</tr>
<tr>
<td>Flavors: 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 pdtelgb 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 xtrpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmx flexpriority ept vpid fsgsbase tsc_adjust bm1 hle avx2 smep bmi2 1rms invpcid rtm cqm mpx rdts_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsdavopt xsaved c咳 l1c cQM_occup l1c cQM_mbm total cQM_mbm local dtherm ida arat pln pts pku ospke avx512_vnni flush_lld arch_capabilities</td>
</tr>
</tbody>
</table>

From: numacell --hardware WARNING: a numacell '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: 46784 MB
  - node 0 free: 44857 MB
  - node 1 cpus: 1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61
  - node 1 size: 48380 MB
  - node 1 free: 46354 MB
  - node 2 cpus: 2 6 10 14 18 22 26 30 34 38 42 46 50 54 58 62
  - node 2 size: 48380 MB
  - node 2 free: 46051 MB
  - node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47 51 55 59 63
  - node 3 size: 48358 MB
  - node 3 free: 45104 MB
- node distances:
  - node 0 1 2 3
  - 0: 10 21 11 21
  - 1: 21 10 21 11

(Continued on next page)
SPEC CPU2017 Floating Point Speed Result

Dell Inc. PowerEdge C6420 (Intel Xeon Gold 5218, 2.30GHz)

SPECspeed2017_fp_base = 112
SPECspeed2017_fp_peak = 112

CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Mar-2019
Tested by: Dell Inc.
Hardware Availability: Apr-2019
Software Availability: Feb-2019

Platform Notes (Continued)

From /proc/meminfo
MemTotal: 196511040 kB
 HugePages_Total: 0
 Hugepagesize: 2048 kB

/usr/bin/lsb_release -d
Ubuntu 18.04.2 LTS

From /etc/*release* /etc/*version*
debian_version: buster/sid
os-release:
  NAME="Ubuntu"
  VERSION="18.04.2 LTS (Bionic Beaver)"
  ID=ubuntu
  ID_LIKE=debian
  PRETTY_NAME="Ubuntu 18.04.2 LTS"
  VERSION_ID="18.04"
  HOME_URL="https://www.ubuntu.com/"
  SUPPORT_URL="https://help.ubuntu.com/"

uname -a:
Linux intel-sut 4.15.0-45-generic #48-Ubuntu SMP Tue Jan 29 16:28:13 UTC 2019 x86_64
x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
CVE-2017-5754 (Meltdown): Not affected
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB

run-level 5 Mar 20 16:15

SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 ext4 439G 25G 392G 6% /

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.

BIOS Dell Inc. 2.1.6 03/04/2019
Memory:
11x 002C069D002C 18ASF2G72PD2-2G9E1 16 GB 2 rank 2933, configured at 2666
1x 00AD00B300AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933, configured at 2666

(Continued on next page)
Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 5218, 2.30GHz)

**SPEC CPU2017 Floating Point Speed Result**

**SPECspeed2017_fp_base = 112**

**SPECspeed2017_fp_peak = 112**

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<td>Feb-2019</td>
</tr>
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</table>

**Platform Notes (Continued)**

4x Not Specified Not Specified

(End of data from sysinfo program)

**Compiler Version Notes**

```
CC  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 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

FC  607.cactuBSSN_s(base, peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

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

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

FC  603.bwaves_s(peak) 649.fotonik3d_s(peak)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

CC  621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(base)
```

(Continued on next page)
Dell Inc.  
PowerEdge C6420 (Intel Xeon Gold 5218, 2.30GHz)

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

Test Date: Mar-2019  
Hardware Availability: Apr-2019  
Software Availability: Feb-2019

SPECspeed2017_fp_base = 112  
SPECspeed2017_fp_peak = 112

Compiler Version Notes (Continued)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

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

(Continued on next page)
Dell Inc.  
PowerEdge C6420 (Intel Xeon Gold 5218, 2.30GHz)  

SPECspeed2017_fp_base = 112  
SPECspeed2017_fp_peak = 112

CPU2017 License: 55  
Test Sponsor: Dell Inc.  
Tested by: Dell Inc.  
Test Date: Mar-2019  
Hardware Availability: Apr-2019  
Software Availability: Feb-2019

Base Portability Flags (Continued)

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:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp  
-nostandard-realloc-lhs

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP  
-nostandard-realloc-lhs

Benchmarks using Fortran, C, and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP  
-nostandard-realloc-lhs

Peak Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64
### SPEC CPU2017 Floating Point Speed Result

**Dell Inc.**

PowerEdge C6420 (Intel Xeon Gold 5218, 2.30GHz)

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

**Test Date:** Mar-2019  
**Hardware Availability:** Apr-2019  
**Software Availability:** Feb-2019

---

### Peak Portability Flags

Same as Base Portability Flags

---

### Peak Optimization Flags

#### C benchmarks:
- `-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`  
- `-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP`

#### Fortran benchmarks:

- `603.bwaves_s: -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP`  
- `-DSPEC_OPENMP -O2 -xCORE-AVX512 -qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=4`  
- `-qopenmp -nostandard-realloc-lhs`

- `649.fotonik3d_s: Same as 603.bwaves_s`

- `654.roms_s: -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4`  
- `-qopenmp -nostandard-realloc-lhs`

#### Benchmarks using both Fortran and C:

- `621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512`  
- `-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp`  
- `-DSPEC_OPENMP -nostandard-realloc-lhs`

- `627.cam4_s: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`  
- `-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs`

- `628.pop2_s: Same as 621.wrf_s`

#### Benchmarks using Fortran, C, and C++:

- `-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`  
- `-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs`

The flags files that were used to format this result can be browsed at:

<table>
<thead>
<tr>
<th>Dell Inc.</th>
<th>SPECspeed2017_fp_peak = 112</th>
</tr>
</thead>
<tbody>
<tr>
<td>PowerEdge C6420 (Intel Xeon Gold 5218, 2.30GHz)</td>
<td>SPECspeed2017_fp_base = 112</td>
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<table>
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<tr>
<th>CPU2017 License: 55</th>
<th>Test Date: Mar-2019</th>
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<tbody>
<tr>
<td>Test Sponsor: Dell Inc.</td>
<td>Hardware Availability: Apr-2019</td>
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<tr>
<td>Tested by: Dell Inc.</td>
<td>Software Availability: Feb-2019</td>
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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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