# SPEC® CPU2017 Floating Point Speed Result

## Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 6242, 2.80GHz)

<table>
<thead>
<tr>
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<td>64</td>
<td>131</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>64</td>
<td>84.6, 82.7</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>64</td>
<td>139</td>
</tr>
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<td>64</td>
<td>110</td>
</tr>
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<td>628.pop2_s</td>
<td>64</td>
<td>65.5, 65.8</td>
</tr>
<tr>
<td>638.imagick_s</td>
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<td>105</td>
</tr>
<tr>
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<td>64</td>
<td>235</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
<td>77.3, 131</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
<td>121</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 6242
- **Max MHz.:** 3900
- **Nominal:** 2800
- **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)
- **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

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

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SPEC CPU2017 Floating Point Speed Result

Dell Inc.
PowerEdge C6420 (Intel Xeon Gold 6242, 2.80GHz)

SPECspeed2017_fp_base = 128
SPECspeed2017_fp_peak = 127

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

| Benchmark | Base | | | | | Peak | | | | |
|-----------|--|--|--|--|--|| Peak | | | | |
| | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 603.bwaves_s | 64 | 127 | 465 | 127 | 465 | 126 | 468 | 64 | 129 | 459 | 127 | 465 | 126 | 468 |
| 607.cactuBSSN_s | 64 | 128 | 130 | 127 | 131 | 128 | 130 | 64 | 127 | 132 | 127 | 131 | 127 | 131 |
| 619.llvm_s | 64 | 61.9 | 84.6 | 61.9 | 84.6 | 62.0 | 84.5 | 64 | 62.1 | 84.3 | 64.0 | 81.9 | 63.3 | 82.7 |
| 621.wrf_s | 64 | 94.8 | 139 | 95.1 | 139 | 95.4 | 139 | 64 | 98.1 | 135 | 98.1 | 135 | 98.4 | 134 |
| 627.cam4_s | 64 | 80.4 | 110 | 80.5 | 110 | 80.6 | 110 | 64 | 80.3 | 110 | 80.3 | 110 | 80.3 | 110 |
| 628.pop2_s | 64 | 179 | 66.2 | 181 | 65.5 | 181 | 65.5 | 64 | 181 | 65.7 | 179 | 66.3 | 180 | 65.8 |
| 638.imagick_s | 64 | 138 | 105 | 138 | 105 | 138 | 104 | 64 | 138 | 105 | 138 | 105 | 138 | 104 |
| 644.nab_s | 64 | 74.5 | 235 | 74.0 | 236 | 74.3 | 235 | 64 | 74.3 | 235 | 74.5 | 234 | 74.6 | 234 |
| 649.fotonik3d_s | 64 | 117 | 78.1 | 118 | 77.3 | 119 | 76.9 | 64 | 118 | 77.3 | 118 | 77.1 | 118 | 77.4 |
| 654.roms_s | 64 | 130 | 121 | 132 | 120 | 130 | 121 | 64 | 131 | 120 | 131 | 120 | 131 | 120 |

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"

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 6242, 2.80GHz)

SPECspeed2017_fp_base = 128
SPECspeed2017_fp_peak = 127

CPU2017 License: 55
Test Sponsor: Dell Inc.
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BIOS settings:
ADDDC setting disabled
Sub NUMA Cluster enabled
Virtualization Technology disabled
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 Sat Apr 27 20:03:58 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 6242 CPU @ 2.80GHz
  2 "physical id"s (chips)
  64 "processors"
cores, siblings (Caution: counting these is hw and system dependent. 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): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85

Platform Notes

(Continued on next page)
Platform Notes (Continued)

Model name: Intel(R) Xeon(R) Gold 6242 CPU @ 2.80GHz
Stepping: 6
CPU MHz: 3321.813
BogoMIPS: 5600.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 22528K
NUMA node0 CPU(s): 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62
NUMA node1 CPU(s): 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63
Flags: fpu vme de pse tsc msr pae mce 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 aes xsave avx1 f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault ebcat l3 dcl unipcd_single ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erts invpcid rtm cr3лат0 xcr0priv xsaveopt xsaveopt xsaves cqm_llc cqm_occp_llc cqm_mmb_total cqm_mmb_local dtherm ida plc pku ospke avx512_vnni flush_l1d arch_capabilities

From /proc/cpuinfo cache data
  cache size: 22528 KB

From /proc/meminfo 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 40 42 44 46 48 50 52 54 56 58 60 62
  node 0 size: 95144 MB
  node 0 free: 89876 MB
  node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51
  node 1 size: 96761 MB
  node 1 free: 94058 MB
  node distances:
    node 0 1
    0: 10 21
    1: 21 10

(Continued on next page)
Dell Inc.

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<td>SPECspeed2017_fp_peak</td>
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Platform Notes (Continued)

MemTotal: 196511384 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 Apr 27 15:21

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 18ASF2G72FD2-2G9E1 16 GB 2 rank 2933
1x 00AD00B300AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933
4x Not Specified Not Specified

(End of data from sysinfo program)
Dell Inc.  

PowerEdge C6420 (Intel Xeon Gold 6242, 2.80GHz)  

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Compiler Version Notes

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<tr>
<td>Version 19.0.1.144 Build 20181018</td>
</tr>
<tr>
<td>Copyright (C) 1985-2018 Intel Corporation. All rights reserved.</td>
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**Compiler Version Notes (Continued)**

```plaintext
==============================================================================
CC   621.wrf_s(peak) 628.pop2_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.
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:  
```plaintext
icc -m64 -std=c11
```

Fortran benchmarks:  
```plaintext
ifort -m64
```

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

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

---

**Base Portability Flags**

```plaintext
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
```
Dell Inc. PowerEdge C6420 (Intel Xeon Gold 6242, 2.80GHz) SPECspeed2017_fp_base = 128 SPECspeed2017_fp_peak = 127

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

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
```

### 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 
```

### 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


You can also download the XML flags sources by saving the following links:

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**Dell Inc.**

**CPU2017 License:** 55

**Test Sponsor:** Dell Inc.

**Tested by:** Dell Inc.

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU2017 v1.0.5 on 2019-04-27 16:03:57-0400.
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