**SPEC® CPU2017 Floating Point Rate Result**

**Dell Inc.**

PowerEdge C6420 (Intel Xeon Gold 6252, 2.10GHz)

**SPECrate2017_fp_base = 238**

**SPECrate2017_fp_peak = 243**

<table>
<thead>
<tr>
<th>Test Sponsor</th>
<th>Dell Inc.</th>
<th>Test Date</th>
<th>Mar-2019</th>
<th>Hardware Availability</th>
<th>Apr-2019</th>
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<td>Software Availability</td>
<td>Feb-2019</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name**: Intel Xeon Gold 6252
- **Max MHz.**: 3700
- **Nominal**: 2100
- **Enabled**: 48 cores, 2 chips, 2 threads/core
- **Orderable**: 1.2 chips
- **Cache L1**: 32 KB I + 32 KB D on chip per core
- **Cache L2**: 1 MB I+D on chip per core
- **Cache L3**: 35.75 MB I+D on chip per core
- **Other**: None
- **Memory**: 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R)
- **Storage**: 1 x 480 GB SATA SSD
- **Other**: None

### Software

- **OS**: Ubuntu 18.04.2 LTS
- **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**: No
- **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 6252, 2.10GHz)

SPECrate2017_fp_base = 238
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
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<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
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</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"

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

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

Dell Inc.
PowerEdge C6420 (Intel Xeon Gold 6252, 2.10GHz)

SPECrate2017_fp_base = 238
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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

General Notes (Continued)

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>

Platform Notes

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 May 4 07:23:23 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 6252 CPU @ 2.10GHz
    2 "physical id"s (chips)
    96 "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 : 24
siblings : 48
physical 0: cores 0 1 2 3 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 25 26 27 28 29
physical 1: 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

From lscpu:
  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit
  Byte Order: Little Endian
  CPU(s): 96

(Continued on next page)
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Platform Notes (Continued)

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 6252 CPU @ 2.10GHz
Stepping: 6
CPU MHz: 2479.152
BogoMIPS: 4200.00
Virtualization: VT-x

L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K

NUMA node0 CPU(s):
0,4,8,10,12,16,20,24,28,32,40,44,48,52,56,58,60,64,68,72,76,80,88,92
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):
2,6,14,18,22,26,30,34,36,38,42,46,50,54,62,66,70,74,78,82,84,86,90,94
NUMA node3 CPU(s):
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 pe syscall nx pdpe1gb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx f16c rdrand lahf_lm abrdesc64prefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single ssbd mba ibrs ibpb stibp ibrs_enhanced trp_shadow vnni 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 avx51cd avx512vd avx512vl xsaveopt xsaves xsave cqm_llc cqm_occachandle cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts pkup ospe avx512_vnni flush_l1d arch_capabilities

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 10 12 16 20 24 28 32 40 44 48 52 56 58 60 64 68 72 76 80 88 92
node 0 size: 95145 MB
node 0 free: 94417 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

(Continued on next page)
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PowerEdge C6420 (Intel Xeon Gold 6252, 2.10GHz)  

![SPEC CPU2017 Floating Point Rate Result](https://www.spec.org/)  

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**Platform Notes (Continued)**

```
node 1 size: 96763 MB  
node 1 free: 96102 MB  
node 2 cpus: 2 6 14 18 22 26 30 34 36 38 42 46 50 54 62 66 70 74 78 82 84 86 90 94  
node 2 size: 96763 MB  
node 2 free: 96231 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: 96160 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: | 394685404 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 May 3 22:09  

(Continued on next page)
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---

### Platform Notes (Continued)

SPEC is set to: /home/cpu2017  
Filesystem   Type Size Used Avail Use% Mounted on  
/dev/sda2   ext4  439G  19G  398G  5% /

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:  
  - 4x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
  - 8x 00AD069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
  - 4x Not Specified Not Specified

(End of data from sysinfo program)

---

### Compiler Version Notes

```
CC  519.lbm_r(base) 538.imagick_r(base, peak) 544.nab_r(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.
```

```
CC  519.lbm_r(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.
```

```
CXXC 508.namd_r(base) 510.parest_r(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.
```

```
CXXC 508.namd_r(peak)
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
```

(Continued on next page)
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</table>

**Compiled programs**

- **SPECrate2017_fp_base**
  - **SPECrate2017_fp_peak**

**Compiler Version Notes (Continued)**

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

---

CC 511.povray_r(base) 526.blender_r(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.

---

CC 511.povray_r(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,
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FC 507.cactuBSSN_r(base, peak)
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Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
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Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
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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 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base)
---

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.

(Continued on next page)
Compiler Version Notes (Continued)

---
FC 554.roms_r(peak)
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Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.1.144 Build 20181018
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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.1.144 Build 20181018
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Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11
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Base Compiler Invocation (Continued)

Benchmarks using both C and C++:
icpc -m64 icc -m64 -std=c11

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

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

(Continued on next page)
## Base Optimization Flags (Continued)

Benchmarks using both C and C++:
- `xCORE-AVX2`
- `ipo`
- `-O3`
- `-no-prec-div`
- `-qopt-prefetch`
- `-ffinite-math-only`
- `-qopt-mem-layout-trans=4`

Benchmarks using Fortran, C, and C++:
- `xCORE-AVX2`
- `ipo`
- `-O3`
- `-no-prec-div`
- `-qopt-prefetch`
- `-ffinite-math-only`
- `-qopt-mem-layout-trans=4`
- `-auto`
- `-nostandard-realloc-lhs`
- `-align array32byte`

## Peak Compiler Invocation

**C benchmarks:**
```
icc -m64 -std=c11
```

**C++ benchmarks:**
```
icpc -m64
```

**Fortran benchmarks:**
```
ifort -m64
```

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

Benchmarks using both C and C++:
```
icpc -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:**
```
519.lbm_r: -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
```

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PEC CPU2017 Floating Point Rate Result

Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 6252, 2.10GHz)

SPECrate2017_fp_base = 238
SPECrate2017_fp_peak = 243

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

Peak Optimization Flags (Continued)

538.imagick_r -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

544.nab_r: Same as 538.imagick_r

C++ benchmarks:

508.namd_r -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

510.parest_r -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Fortran benchmarks:

503.bwaves_r -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte

549.fotonik3d_r: Same as 503.bwaves_r

554.roms_r -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 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both Fortran and C:

-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 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both C and C++:

511.povray_r -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

526.blender_r -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Benchmarks using Fortran, C, and C++:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only

(Continued on next page)
Dell Inc.
PowerEdge C6420 (Intel Xeon Gold 6252, 2.10GHz)

SPECrate2017_fp_base = 238
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Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

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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Tested with SPEC CPU2017 v1.0.5 on 2019-05-04 03:23:23-0400.
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