## SPEC® CPU2017 Floating Point Rate Result

**Dell Inc.**

PowerEdge MX740c (Intel Xeon Silver 4210, 2.20GHz)

### CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Mar-2019

Hardware Availability: Apr-2019

Software Availability: Mar-2019

### Hardware

<table>
<thead>
<tr>
<th>Spec ID</th>
<th>Description</th>
<th>Copies</th>
<th>SPECrate2017_fp_base</th>
<th>SPECrate2017_fp_peak</th>
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<tr>
<td>503.bwaves_r</td>
<td></td>
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<td>85.6</td>
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<tr>
<td>507.caactuBSSN_r</td>
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<td>508.namd_r</td>
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<th>OS: Ubuntu 18.04.2 LTS</th>
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<tr>
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<td>kernel 4.15.0-46-generic</td>
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<td>System State: Run level 3 (multi-user)</td>
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<tr>
<td></td>
<td>Base Pointers: 64-bit</td>
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<tr>
<td></td>
<td>Peak Pointers: 64-bit</td>
</tr>
<tr>
<td></td>
<td>Other: None</td>
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</table>

### System Info

- **CPU Name:** Intel Xeon Silver 4210
- **Max MHz.:** 3200
- **Nominal:** 2200
- **Enabled:** 20 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:** 13.75 MB I+D on chip per chip
- **Memory:** 384 GB (12 x 32 GB 2Rx8 PC4-2933Y-R, running at 2400)
- **Storage:** 1 x 480 GB SATA SSD
- **Other:** None
SPEC CPU2017 Floating Point Rate Result

Dell Inc.

PowerEdge MX740c (Intel Xeon Silver 4210, 2.20GHz)

SPECrate2017_fp_base = 96.9
SPECrate2017_fp_peak = 99.2

Results Table

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<td>41.5</td>
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</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 MX740c (Intel Xeon Silver 4210, 2.20GHz)

<table>
<thead>
<tr>
<th>SPECrate2017_fp_peak</th>
<th>SPECrate2017_fp_base</th>
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<tbody>
<tr>
<td>99.2</td>
<td>96.9</td>
</tr>
</tbody>
</table>

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

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 Jun 1 23:46:12 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) Silver 4210 CPU @ 2.20GHz
  2  "physical id"s (chips)
  40 "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 : 10
  siblings : 20
  physical 0: cores 0 1 2 3 4 8 9 10 11 12
  physical 1: cores 0 1 2 3 4 8 9 10 11 12

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 40

(Continued on next page)
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SPECrate2017_fp_peak = 99.2

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

Platform Notes (Continued)

On-line CPU(s) list: 0-39
Thread(s) per core: 2
Core(s) per socket: 10
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4210 CPU @ 2.20GHz
Stepping: 6
CPU MHz: 2650.142
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 14080K
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 pe syscall nx pdpe1gb rdtsscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmpref perfctr dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt aes avx f16c rdrand
lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_pinn
ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmflex xsaveopt avx vtbm
fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f
avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occpt_llc cqm_mbb_total cqm_mbb_local
dtherm ida arat pinn pts pku ospke avx512_vnni flush_l1d arch_capabilities

/proccpuinfo cache data
cache size : 14080 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: 192858 MB
node 0 free: 191977 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: 193510 MB
node 1 free: 192515 MB
node distances:
node 0 1
0: 10 21
1: 21 10

(Continued on next page)
Dell Inc.

PowerEdge MX740c (Intel Xeon Silver 4210, 2.20GHz)

SPEC CPU2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Dell Inc.

PowerEdge MX740c (Intel Xeon Silver 4210, 2.20GHz)

SPECrate2017_fp_base = 96.9

SPECrate2017_fp_peak = 99.2

Platform Notes (Continued)

From /proc/meminfo
MemTotal: 395641848 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
  IDLIKE=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 4.15.0-46-generic #49-Ubuntu SMP Wed Feb 6 09:33:07 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 3 Jun 1 14:07

SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 ext4 439G 20G 397G 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. 2.2.9 05/08/2019

Memory:
  11x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2400
  1x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2400
  12x Not Specified Not Specified

(Continued on next page)
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CPU2017 License: 55
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Test Date: Mar-2019
Hardware Availability: Apr-2019
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Platform Notes (Continued)

(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,
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Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
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### Compiler Version Notes (Continued)

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

```
FC  507.cactuBSSN_r(base, 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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FC  503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base)
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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
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

```
FC  554.roms_r(peak)
```

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) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.1.144 Build 20181018
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- **SPECrate2017_fp_peak** = 99.2

**Compiler Version Notes (Continued)**

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

- **Base Portability Flags**
  - 503.bwaves_r: -DSPEC_LP64
  - 507.cactuBSSN_r: -DSPEC_LP64
  - 508.namd_r: -DSPEC_LP64
  - 510.parest_r: -DSPEC_LP64

(Continued on next page)
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PowerEdge MX740c (Intel Xeon Silver 4210, 2.20GHz)  

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**CPU2017 License:** 55  
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---

### Base Portability Flags (Continued)

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

**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
### Dell Inc. PowerEdge MX740c (Intel Xeon Silver 4210, 2.20GHz)

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<tr>
<th>CPU2017 License: 55</th>
<th>SPECrate2017_fp_base = 96.9</th>
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<td>Test Date: Mar-2019</td>
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<td>Hardware Availability: Apr-2019</td>
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**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
  - 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

(Continued on next page)
Peak Optimization Flags (Continued)

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
-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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