## SPEC® CPU2017 Floating Point Rate Result

**Dell Inc.**

PowerEdge R740 (Intel Xeon Silver 4214, 2.20GHz)

<table>
<thead>
<tr>
<th>CPU2017 License: 55</th>
<th>Test Sponsor: Dell Inc.</th>
<th>Test Date: Apr-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested by: Dell Inc.</td>
<td>Hardware Availability: Apr-2019</td>
<td>Software Availability: Jan-2019</td>
</tr>
</tbody>
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### SPECrate2017_fp_base = 139

### SPECrate2017_fp_peak = 143

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>SPECrate2017_fp_base</th>
<th>SPECrate2017_fp_peak</th>
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<tbody>
<tr>
<td>503.bwaves_r</td>
<td>48</td>
<td>109</td>
<td>143</td>
</tr>
<tr>
<td>507.cactuBSSN_r</td>
<td>48</td>
<td>94.3</td>
<td>122</td>
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<td>508.namd_r</td>
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<td>293</td>
</tr>
<tr>
<td>549.fotonik3d_r</td>
<td>48</td>
<td>126</td>
<td>211</td>
</tr>
<tr>
<td>554.roms_r</td>
<td>48</td>
<td>68.3</td>
<td>77.0</td>
</tr>
</tbody>
</table>

---

### Hardware

- **CPU Name:** Intel Xeon Silver 4214
- **Max MHz.:** 3200
- **Nominal:** 2200
- **Enabled:** 24 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:** 16.5 MB I+D on chip per chip
- **Other:** None
- **Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)
- **Storage:** 1 x 960 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 2.1.7 released Apr-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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Results Table

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<tr>
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SPECrate2017_fp_base = 139
SPECrate2017_fp_peak = 143

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
Yes: 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)
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**Test Date:** Apr-2019  
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---

**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 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 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 Thu Apr 4 20:17:14 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 4214 CPU @ 2.20GHz
  2 "physical id"s (chips)
  48 "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 : 12
  siblings : 24
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13
```

From lscpu:
```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 48
```

---

(Continued on next page)
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Platform Notes (Continued)

On-line CPU(s) list: 0-47
Thread(s) per core: 2
Core(s) per socket: 12
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4214 CPU @ 2.20GHz
Stepping: 6
CPU MHz: 2361.296
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 16896K
NUMA node0 CPU(s): 0,4,8,12,16,20,24,28,32,36,40,44
NUMA node1 CPU(s): 1,5,9,13,17,21,25,29,33,37,41,45
NUMA node2 CPU(s): 2,6,10,14,18,22,26,30,34,38,42,46
NUMA node3 CPU(s): 3,7,11,15,19,23,27,31,35,39,43,47

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 pdpe1gb rdtdsc
lms constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmprefx 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 avx f16c rdrand
lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single ssbd mba ibrs
ibpb intel_pt x2apic msmirm aperfopt msr_dtrust msr_lstar msr_pstar msr_cstar msr_tsc
msr[vl coll msr ===== hypothesis invalidate issuing ivf xpddep debug_level

/proc/cpuinfo cache data

    cache size : 16896 KB

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 12 16 20 24 28 32 36 40 44
    node 0 size: 95169 MB
    node 0 free: 94699 MB
    node 1 cpus: 1 5 9 13 17 21 25 29 33 37 41 45
    node 1 size: 96745 MB
    node 1 free: 96277 MB
    node 2 cpus: 2 6 10 14 18 22 26 30 34 38 42 46
    node 2 size: 96744 MB

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Platform Notes (Continued)

node 2 free: 96317 MB
node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47
node 3 size: 96764 MB
node 3 free: 96154 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:       394694752 kB
  HugePages_Total:      0
  Hugepagesize:       2048 kB

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 4 12:19

SPEC is set to: /home/cpu2017

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda2</td>
<td>ext4</td>
<td>439G</td>
<td>19G</td>
<td>398G</td>
<td>5%</td>
<td></td>
</tr>
</tbody>
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(Continued on next page)
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**Platform Notes (Continued)**

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. 2.1.7 04/03/2019
- Memory:
  - 12x 00AD069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2400
  - 12x Not Specified Not Specified

(End of data from sysinfo program)

**Compiler Version Notes**

```plaintext
==============================================================================
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.
------------------------------------------------------------------------------

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CXXC 508.namd_r(base) 510.parest_r(base, peak)
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**Compiler Version Notes (Continued)**

```
CC   511.povray_r(base) 526.blender_r(base, peak)
```

---

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CC   511.povray_r(peak)
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---

```
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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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.

---

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FC   554.roms_r(peak)
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Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R)

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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.
==============================================================================

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

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
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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 -fun signed-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 R740 (Intel Xeon Silver 4214, 2.20GHz)

| SPECrate2017_fp_base = 139 |
| SPECrate2017_fp_peak = 143 |

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

Test Date: Apr-2019
Hardware Availability: Apr-2019
Software Availability: Jan-2019

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)
Dell Inc.

PowerEdge R740 (Intel Xeon Silver 4214, 2.20GHz)

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CPU2017 License: 55
Test Sponsor: Dell Inc.
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Test Date: Apr-2019
Hardware Availability: Apr-2019
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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: basepeak = yes
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: basepeak = yes

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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<th>Dell Inc.</th>
<th>SPEC CPU2017 Floating Point Rate Result</th>
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<tbody>
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<td>SPECrate2017_fp_base = 139</td>
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<td>SPECrate2017_fp_peak = 143</td>
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</table>

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

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Tested with SPEC CPU2017 v1.0.5 on 2019-04-04 16:17:13-0400.