**SPEC CPU®2017 Floating Point Rate Result**

**Dell Inc.**

PowerEdge T440 (Intel Xeon Gold 5215, 2.50 GHz)

**SPECrate®2017_fp_base = 119**

**SPECrate®2017_fp_peak = 126**

---

**CPU2017 License:** 55

**Test Sponsor:** Dell Inc.

**Tested by:** Dell Inc.

**Test Date:** Apr-2020

**Hardware Availability:** Feb-2020

**Software Availability:** Nov-2019

---

<table>
<thead>
<tr>
<th>Software</th>
<th>Value</th>
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<tbody>
<tr>
<td>OS</td>
<td>Red Hat Enterprise Linux 8.1</td>
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<tr>
<td>Compiler</td>
<td>C/C++: Version 19.0.5.281 of Intel C/C++ Compiler for Linux</td>
</tr>
<tr>
<td>Fortran</td>
<td>Version 19.0.5.281 of Intel Fortran Compiler for Linux</td>
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<tr>
<td>Parallel</td>
<td>No</td>
</tr>
<tr>
<td>Firmware</td>
<td>Version 2.5.4 released Jan-2020</td>
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<tr>
<td>File System</td>
<td>xfs</td>
</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers</td>
<td>64-bit</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
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<table>
<thead>
<tr>
<th>Hardware</th>
<th>Value</th>
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<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon Gold 5215</td>
</tr>
<tr>
<td>Max MHz</td>
<td>3400</td>
</tr>
<tr>
<td>Nominal</td>
<td>2500</td>
</tr>
<tr>
<td>Enabled</td>
<td>20 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Orderable</td>
<td>1,2 chips</td>
</tr>
<tr>
<td>Cache L1</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3</td>
<td>13.75 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>384 GB (12 x 32 GB 2Rx8 PC4-2933V-R, running at 2933)</td>
</tr>
<tr>
<td>Storage</td>
<td>1 x 1.92 TB SATA SSD</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
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**SPEC CPU®2017 Floating Point Rate Result**

---

**Copies**

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<thead>
<tr>
<th>Program</th>
<th>Value</th>
<th>SPECrate®2017_fp_base</th>
<th>SPECrate®2017_fp_peak</th>
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<tbody>
<tr>
<td>503.bwaves_r</td>
<td>93.2</td>
<td>119</td>
<td>126</td>
</tr>
<tr>
<td>507.cactuBSSN_r</td>
<td>80.9</td>
<td>125</td>
<td>134</td>
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<tr>
<td>508.namd_r</td>
<td>62.9</td>
<td>137</td>
<td>138</td>
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<tr>
<td>510.parest_r</td>
<td>72.5</td>
<td>150</td>
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<tr>
<td>511.povray_r</td>
<td>79.3</td>
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<td>526.blender_r</td>
<td>119</td>
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<td>527.cam4_r</td>
<td>125</td>
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<td>260</td>
</tr>
<tr>
<td>538.imagick_r</td>
<td>188</td>
<td>332</td>
<td>332</td>
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<tr>
<td>544.nab_r</td>
<td>58.5</td>
<td>73.3</td>
<td>73.3</td>
</tr>
<tr>
<td>549.fotonik3d_r</td>
<td>119</td>
<td>125</td>
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<tr>
<td>554.roms_r</td>
<td>58.5</td>
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<td>73.3</td>
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</tbody>
</table>

---

**Test Sponsor:** Dell Inc.

**Hardware Availability:** Feb-2020

**Software Availability:** Nov-2019

---

**Power Management:** BIOS set to prefer performance at the cost of additional power usage.
### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>323</td>
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<td>324</td>
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<tr>
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<td>541</td>
<td>93.6</td>
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<td>93.2</td>
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<td>541</td>
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<tr>
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<td>81.6</td>
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<td>63.4</td>
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<tr>
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<td>519.lbm_r</td>
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<tr>
<td>527.cam4_r</td>
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<td>119</td>
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<tr>
<td>538.imagick_r</td>
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<td>20</td>
<td>433</td>
</tr>
</tbody>
</table>

**SPECrate®2017_fp_base = 119**

**SPECrate®2017_fp_peak = 126**

### 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"

### Environment Variables Notes

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

- LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64"
- MALLOC_CONF = "retain:true"

### General Notes

Binaries compiled on a system with 1x Intel Core i9-9900K CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0

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)

(Continued on next page)
General Notes (Continued)

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>

Platform Notes

BIOS settings:
Virtualization Technology 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
UPI Prefetch enabled
LLC Prefetch disabled
Dead Line LLC Alloc enabled
Directory AtoS disabled
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011
running on localhost.localdomain Thu Apr 16 20:37:48 2020

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 5215 CPU @ 2.50GHz
    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

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

Dell Inc. PowerEdge T440 (Intel Xeon Gold 5215, 2.50 GHz) SPECrate®2017_fp_base = 119
SPECrate®2017_fp_peak = 126

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

Test Date: Apr-2020
Hardware Availability: Feb-2020
Software Availability: Nov-2019

Platform Notes (Continued)

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
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) Gold 5215 CPU @ 2.50GHz
Stepping: 6
CPU MHz: 1536.215
CPU max MHz: 3400.0000
CPU min MHz: 1000.0000
BogoMIPS: 5000.00
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 pbe syscall nx pdpe1gb rdtscp
lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfperf 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 tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
invpcid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmni
flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
cqm_mbx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaveas cqm_llc cqm_occup_llc cqm_mbb_total
cqm_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d
arch_capabilities

/proc/cpuinfo 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)

(Continued on next page)
### Platform Notes (Continued)

```plaintext
code
node 0 cpus: 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38
code
node 0 size: 192073 MB
code
node 0 free: 191121 MB
code
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39
code
node 1 size: 193505 MB
code
node 1 free: 172329 MB
code
node distances:
code
node  0   1
code
0: 10 21
code
1: 21 10
```

From `/proc/meminfo`

<table>
<thead>
<tr>
<th>MemTotal:</th>
<th>394833816 kB</th>
</tr>
</thead>
<tbody>
<tr>
<td>HugePages_Total:</td>
<td>0</td>
</tr>
<tr>
<td>Hugepagesize:</td>
<td>2048 kB</td>
</tr>
</tbody>
</table>

From `/etc/*release*` /etc/*version*

```plaintext
code
os-release:
NAME="Red Hat Enterprise Linux"
VERSION="8.1 (Ootpa)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="8.1"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.1 (Ootpa)"
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.1:ga
```

```plaintext
code
uname -a:
Linux localhost.localdomain 4.18.0-147.el8.x86_64 #1 SMP Thu Sep 26 15:52:44 UTC 2019
x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

- **CVE-2018-3620 (L1 Terminal Fault):** Not affected
- **Microarchitectural Data Sampling:** Not affected
- **CVE-2017-5754 (Meltdown):** Not affected
- **CVE-2018-3639 (Speculative Store Bypass):** Mitigation: Speculative Store Bypass disabled via prctl and seccomp
- **CVE-2017-5753 (Spectre variant 1):** Mitigation: usercopy/swapgs barriers and __user pointer sanitization
- **CVE-2017-5715 (Spectre variant 2):** Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

run-level 3 Apr 16 14:05 last=5

(Continued on next page)
Dell Inc.  
PowerEdge T440 (Intel Xeon Gold 5215, 2.50 GHz)  

SPECraten®2017_fp_base = 119  
SPECraten®2017_fp_peak = 126

CPU2017 License: 55  
Test Sponsor: Dell Inc.  
Test Date: Apr-2020  
Tested by: Dell Inc.  
Hardware Availability: Feb-2020  
Software Availability: Nov-2019

Platform Notes (Continued)

SPEC is set to: /home/cpu2017
Filesystem     Type  Size  Used  Avail Use% Mounted on
/dev/mapper/rhel-home xfs  1.7T  20G  1.7T   2% /home

From /sys/devices/virtual/dmi/id  
BIOS:  Dell Inc.  2.5.4 01/14/2020  
Vendor: Dell Inc.  
Product: PowerEdge T440  
Product Family: PowerEdge  
Serial: FBLH613

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.
Memory:
4x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933  
8x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933  
4x Not Specified Not Specified

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C                  | 519.lbm_r(base, peak) 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 19.0.5.281 Build 20190815  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
==============================================================================
C++                | 508.namd_r(base, peak) 510.parest_r(base, peak)
==============================================================================
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.5.281 Build 20190815  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
==============================================================================
C++, C              | 511.povray_r(base, peak) 526.blender_r(base, peak)
==============================================================================
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Dell Inc. PowerEdge T440 (Intel Xeon Gold 5215, 2.50 GHz)

**SPECrater®2017_fp_base = 119**

**SPECrater®2017_fp_peak = 126**

<table>
<thead>
<tr>
<th>CPU2017 License: 55</th>
<th>Test Date: Apr-2020</th>
</tr>
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<tbody>
<tr>
<td>Test Sponsor: Dell Inc.</td>
<td>Hardware Availability: Feb-2020</td>
</tr>
<tr>
<td>Tested by: Dell Inc.</td>
<td>Software Availability: Nov-2019</td>
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</tbody>
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**Compiler Version Notes (Continued)**

Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Intel (R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

------------------------------------------------------------------------------

**Base Compiler Invocation**

C benchmarks:

```
icc
```

(Continued on next page)
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Base Compiler Invocation (Continued)

C++ benchmarks:
icpc
Fortran benchmarks:
ifort
Benchmarks using both Fortran and C:
ifort icc
Benchmarks using both C and C++:
icpc icc
Benchmarks using Fortran, C, and C++:
icpc icc ifort

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.ibm_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:
-m64 -std=c11 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

C++ benchmarks:
-m64 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

(Continued on next page)
Dell Inc.
PowerEdge T440 (Intel Xeon Gold 5215, 2.50 GHz)

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

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Dell Inc.

Test Sponsor: Dell Inc.
Test Date: Apr-2020
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Base Optimization Flags (Continued)

Fortran benchmarks:
-m64 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs

Benchmarks using both Fortran and C:
-m64 -std=c11 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs

Benchmarks using both C and C++:
-m64 -std=c11 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Benchmarks using Fortran, C, and C++:
-m64 -std=c11 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs

Peak Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using both C and C++:
icpc icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort
Dell Inc.  
PowerEdge T440 (Intel Xeon Gold 5215, 2.50 GHz)  

SPECrates®2017_fp_base = 119  
SPECrates®2017_fp_peak = 126

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

Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
519.lbm_r: -m64 -std=c11 -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: basepeak = yes
544.nab_r: basepeak = yes

C++ benchmarks:
508.namd_r: -m64 -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: -m64 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4

Fortran benchmarks:
503.bwaves_r: -m64 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -auto  
-nostandard-realloc-lhs

549.fotonik3d_r: basepeak = yes
554.roms_r: -m64 -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

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

Benchmarks using both C and C++:

(Continued on next page)
**SPEC CPU®2017 Floating Point Rate Result**

**Dell Inc.**

PowerEdge T440 (Intel Xeon Gold 5215, 2.50 GHz)

<table>
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<tr>
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</table>

**CPU2017 License:** 55

**Test Sponsor:** Dell Inc.

**Tested by:** Dell Inc.

**Test Date:** Apr-2020

**Hardware Availability:** Feb-2020

**Software Availability:** Nov-2019

**Peak Optimization Flags (Continued)**

- 511.povray_r: -m64 -std=c11 -prof-gen(pass 1) -prof-use(pass 2) --ipo
- xCORE-AVX2 -03 -no-prec-div -qopt-prefetch
- -ffinite-math-only -qopt-mem-layout-trans=4

- 526.blender_r: basepeak = yes

- Benchmarks using Fortran, C, and C++:
  - 507.cactuBSSN_r: basepeak = yes

---

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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