## Dell Inc.

### PowerEdge FC640 (Intel Xeon Bronze 3204, 1.90GHz)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>40.2</td>
<td>40.4</td>
</tr>
</tbody>
</table>

#### Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon Bronze 3204</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz.:</td>
<td>1900</td>
</tr>
<tr>
<td>Nominal:</td>
<td>1900</td>
</tr>
<tr>
<td>Enabled:</td>
<td>12 cores, 2 chips</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>8.25 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 PC4-2933Y-R, running at 2133)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 480 GB SATA SSD</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
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</table>

#### Software

<table>
<thead>
<tr>
<th>OS:</th>
<th>Ubuntu 18.04.2 LTS</th>
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<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 19.0.1.144 of Intel C/C++</td>
</tr>
<tr>
<td></td>
<td>Compiler Build 20181018 for Linux; Fortran: Version 19.0.1.144 of Intel Fortran</td>
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<tr>
<td></td>
<td>Compiler Build 20181018 for Linux</td>
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<tr>
<td>Parallel:</td>
<td>Yes</td>
</tr>
<tr>
<td>Firmware:</td>
<td>Version 2.2.2 released Mar-2019</td>
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<tr>
<td>File System:</td>
<td>ext4</td>
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<tr>
<td>System State:</td>
<td>Run level 5 (multi-user)</td>
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<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
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<tr>
<td>Peak Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
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### Test Details

- **CPU2017 License:** 55
- **Test Sponsor:** Dell Inc.
- **Tested by:** Dell Inc.
- **Test Date:** Mar-2019
- **Hardware Availability:** Apr-2019
- **Software Availability:** Feb-2019
SPEC CPU2017 Floating Point Speed Result

Dell Inc.

PowerEdge FC640 (Intel Xeon Bronze 3204, 1.90GHz)

SPECspeed2017_fp_base = 40.2
SPECspeed2017_fp_peak = 40.4

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Seconds</th>
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<th>Seconds</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>12</td>
<td>328</td>
<td>180</td>
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<td>329</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<td>370</td>
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<td>12</td>
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<td>45.2</td>
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<td>638.imagick_s</td>
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<td>47.5</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>33.5</td>
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<td>33.5</td>
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<td>12</td>
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<td>33.6</td>
<td>272</td>
<td>33.5</td>
<td>271</td>
<td>33.6</td>
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<tr>
<td>654.roms_s</td>
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<td>399</td>
<td>39.5</td>
<td>400</td>
<td>39.4</td>
<td>399</td>
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<td>12</td>
<td>400</td>
<td>39.3</td>
<td>400</td>
<td>39.4</td>
<td>400</td>
<td>39.4</td>
</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
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 FC640 (Intel Xeon Bronze 3204, 1.90GHz)  

SPECspeed2017_fp_base = 40.2  
SPECspeed2017_fp_peak = 40.4  

<table>
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<th>CPU2017 License: 55</th>
<th>Test Date: Mar-2019</th>
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<td>Test Sponsor: Dell Inc.</td>
<td>Hardware Availability: Apr-2019</td>
</tr>
<tr>
<td>Tested by: Dell Inc.</td>
<td>Software Availability: Feb-2019</td>
</tr>
</tbody>
</table>

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
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 25 01:30:37 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) Bronze 3204 CPU @ 1.90GHz
    2 "physical id"s (chips)
    12 "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 : 6
    siblings : 6
    physical 0: cores 0 1 2 3 4 5
    physical 1: cores 0 1 2 3 4 5

From lscpu:

    Architecture:     x86_64
    CPU op-mode(s):   32-bit, 64-bit
    Byte Order:       Little Endian
    CPU(s):           12
    On-line CPU(s) list: 0-11
    Thread(s) per core: 1
    Core(s) per socket: 6
    Socket(s):        2
    NUMA node(s):     2
    Vendor ID:        GenuineIntel
    CPU family:       6
    Model:            85
    Model name:       Intel(R) Xeon(R) Bronze 3204 CPU @ 1.90GHz
Dell Inc. PowerEdge FC640 (Intel Xeon Bronze 3204, 1.90GHz)

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

SPECspeed2017_fp_base = 40.2
SPECspeed2017_fp_peak = 40.4

Platform Notes (Continued)

Stepping: 6  
CPU MHz: 1899.101  
BogoMIPS: 3800.00  
Virtualization: VT-x  
L1d cache: 32K  
L1i cache: 32K  
L2 cache: 1024K  
L3 cache: 8448K  
NUMA node0 CPU(s): 0,2,4,6,8,10  
NUMA node1 CPU(s): 1,3,5,7,9,11

Flags:  
fpu vme de pse tsc msr 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 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  
xtrunc 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 ibpb  
ibrs Enhanced tpr_shadow vmx flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2  
smep bmi2 3dnow invpcid rtm cqm mpx rdts_a avx512f avx512dq rdseed adx smap  
ciflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves xsavec xgetbv1  
xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm arat pln pts pku  
ospke avx512_vnni flush_l1d arch_capabilities

/proc/cpuinfo cache data  
cache size: 8448 KB

From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a  
physical chip.  
available: 2 nodes (0-1)  
ode 0 cpus: 0 2 4 6 8 10  
ode 0 size: 192879 MB  
ode 0 free: 188931 MB  
ode 1 cpus: 1 3 5 7 9 11  
ode 1 size: 193513 MB  
ode 1 free: 188459 MB  
node distances:

node 0 1
 0: 10 21  
1: 21 10

From /proc/meminfo  
MemTotal: 395665932 kB  
HugePages_Total: 0  
Hugepagesize: 2048 kB

/usr/bin/lsb_release -d
Ubuntu 18.04.2 LTS

(Continued on next page)
**Dell Inc.**

PowerEdge FC640 (Intel Xeon Bronze 3204, 1.90GHz)

- **SPECspeed2017_fp_base** = 40.2
- **SPECspeed2017_fp_peak** = 40.4

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

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

---

**Platform Notes (Continued)**

From `/etc/*release* /etc/*version*`  
`debian_version: buster/sid`  
`os-release:`

```bash
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/"
```

```bash
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 23 19:19

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. 2.2.2 03/05/2019
- Memory:
  - 3x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2133
  - 9x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2133
  - 4x Not Specified Not Specified

(End of data from `sysinfo` program)

---

**Compiler Version Notes**

```
CC  619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base, peak)
```

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,

(Continued on next page)
## Dell Inc.

**PowerEdge FC640 (Intel Xeon Bronze 3204, 1.90GHz)**

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>40.2</th>
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<tr>
<td>SPECspeed2017_fp_peak</td>
<td>40.4</td>
</tr>
</tbody>
</table>

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

**Compiler Version Notes (Continued)**

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

==============================================================================
FC  607.cactuBSSN_s(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.
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  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base, 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.

==============================================================================
FC  603.bwaves_s(peak) 649.fotonik3d_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.

==============================================================================
CC  621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(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.
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  621.wrf_s(peak) 628.pop2_s(peak)
```
Compiler Version Notes (Continued)

---

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:
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

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactusBSSN_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

Base Optimization Flags

C benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch

(Continued on next page)
### Dell Inc.

**PowerEdge FC640 (Intel Xeon Bronze 3204, 1.90GHz)**

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<thead>
<tr>
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<td>Dell Inc.</td>
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<td>Dell Inc.</td>
</tr>
</tbody>
</table>

### Base Optimization Flags (Continued)

- **C benchmarks (continued):**
  - `-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`

(Continued on next page)
Dell Inc. PowerEdge FC640 (Intel Xeon Bronze 3204, 1.90GHz)

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CPU2017 License: 55
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Tested by: Dell Inc.

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

Peak Optimization Flags (Continued)

C benchmarks (continued):
-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
649.fotonik3d_s: Same as 603.bwaves_s
654.roms_s: -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:
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
627.cam4_s: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -nostandard-realloc lhs
628.pop2_s: Same as 621.wrf_s

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:
<table>
<thead>
<tr>
<th>Dell Inc.</th>
<th>SPEC CPU2017 Floating Point Speed Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>PowerEdge FC640 (Intel Xeon Bronze 3204, 1.90GHz)</td>
<td>SPECspeed2017_fp_peak = 40.4</td>
</tr>
<tr>
<td>SPECspeed2017_fp_base = 40.2</td>
<td></td>
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<tr>
<td>Dell Inc.</td>
<td>Dell Inc.</td>
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<tr>
<td>Dell Inc.</td>
<td>Dell Inc.</td>
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</tbody>
</table>

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

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