## Dell Inc.

**PowerEdge FC640 (Intel Xeon Platinum 8260, 2.40GHz)**

| Copies | 0 | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 | 390 | 420 | 450 | 480 | 510 | 540 | 570 | 600 | 630 |
|--------|---|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 503.bwaves_r | 96 | | | | | | | | | | | | | | | | | | | | | | | | |
| 507.cactuBSSN_r | 96 | | | | | | | | | | | | | | | | | | | | | | | | |
| 508.namd_r | 96 | | | | | | | | | | | | | | | | | | | | | | | | |
| 510.parest_r | 96 | | | | | | | | | | | | | | | | | | | | | | | | |
| 511.povray_r | 96 | | | | | | | | | | | | | | | | | | | | | | | | |
| 519.lbm_r | 96 | | | | | | | | | | | | | | | | | | | | | | | | |
| 521.wrf_r | 96 | | | | | | | | | | | | | | | | | | | | | | | | |
| 526.blender_r | 96 | | | | | | | | | | | | | | | | | | | | | | | | |
| 527.cam4_r | 96 | | | | | | | | | | | | | | | | | | | | | | | | |
| 538.imagick_r | 96 | | | | | | | | | | | | | | | | | | | | | | | | |
| 544.nab_r | 96 | | | | | | | | | | | | | | | | | | | | | | | | |
| 549.fotonik3d_r | 96 | | | | | | | | | | | | | | | | | | | | | | | | |
| 554.roms_r | 96 | | | | | | | | | | | | | | | | | | | | | | | | |

### Hardware

- **CPU Name:** Intel Xeon Platinum 8260
- **Max MHz.:** 3900
- **Nominal:** 2400
- **Enabled:** 48 cores, 2 chips, 2 threads/core
- **Orderable:** 1.2 chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 1 MB I+D on chip per core
- **L3:** 35.75 MB I+D on chip per chip
- **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
- **File System:** ext4
- **System State:** Run level 5 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** None

### SPECrte2017_fp_results

- **SPECrte2017_fp_base = 239**
- **SPECrte2017_fp_peak = 244**
## SPEC CPU2017 Floating Point Rate Result

### Dell Inc.
PowerEdge FC640 (Intel Xeon Platinum 8260, 2.40GHz)

**SPECrate2017_fp_base = 239**

**SPECrate2017_fp_peak = 244**

### Results Table

<table>
<thead>
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<td>100</td>
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<td>99.8</td>
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</tr>
</tbody>
</table>

### 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)
Dell Inc.
PowerEdge FC640 (Intel Xeon Platinum 8260, 2.40GHz)

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

SPECrate2017_fp_base = 239
SPECrate2017_fp_peak = 244

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 Tue May 7 07:20:04 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) Platinum 8260 CPU @ 2.40GHz
  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 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 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) Platinum 8260 CPU @ 2.40GHz
Stepping: 6
CPU MHz: 2202.131
BogoMIPS: 4800.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s):
0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60,64,68,72,76,80,84,88,92
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):
2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62,66,70,74,78,82,86,90,94
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 pbe syscall nx pdpes gb rdtscp
  lm constant_tsc 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
  xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt aes xsave f16c rdrand
  lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single ssbd mba ibrs
  ibpb stibp ibrs_enhanced tpr_shadow vmbi flexpriority ept vpid fsgsbase tsc_adjust
  bmi1 hle avx2 smep bmi2  erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx
  smap clflushopt clwb intel_pt avx51cd avx512vd avx512vl xsaveopt xsavec xgetbv1
  xsaves cqm_llc cqm_occop_llc cqm_mb_mtotal cqm_mb_mlocal dtherm ida arat pln pts kpu
  ospk axv512_vnni flush_lld arch_capabilities

/proc/cpuinfo cache data
cache size: 36608 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 48 52 56 60 64 68 72 76 80 84 88 92
node 0 size: 95164 MB
node 0 free: 94493 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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SPEC CPU2017 Floating Point Rate Result
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SPECrate2017_fp_base = 239
SPECrate2017_fp_peak = 244

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

Platform Notes (Continued)

node 1 size: 96763 MB
node 1 free: 96077 MB
node 2 cpus: 2 6 10 14 18 22 26 30 34 38 42 46 50 54 58 62 66 70 74 78 82 86 90 94
node 2 size: 96742 MB
node 2 free: 96182 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: 96182 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: 394682436 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /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 6 22:08

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

Dell Inc.

PowerEdge FC640 (Intel Xeon Platinum 8260, 2.40GHz)

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

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)

SPEC is set to: /home/cpu2017
Filesistema 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. 2.2.2 03/05/2019
Memory:
3x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
9x 00AD063200AD 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.
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CXXC 508.namd_r(base) 510.parest_r(base, peak)
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CXXC 508.namd_r(peak)
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Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,

(Continued on next page)
Dell Inc.
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SPECrate2017_fp_base = 239
SPECrate2017_fp_peak = 244

Compiler Version Notes (Continued)

Version 19.0.1.144 Build 20181018
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CC  511.povray_r(base) 526.blender_r(base, peak)
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SPEC CPU2017 Floating Point Rate Result

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---

SPECrate2017_fp_base = 239
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---

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

---

Compiler Version Notes (Continued)

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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

---

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

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

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

### Base Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
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<tbody>
<tr>
<td>503.bwaves_r</td>
<td>-DSPEC_LP64</td>
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<td>519.lbm_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>521.wrf_r</td>
<td>-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian</td>
</tr>
<tr>
<td>526.blender_r</td>
<td>-DSPEC_LP64 -DSPEC_LINUX -funsigned-char</td>
</tr>
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<td>527.cam4_r</td>
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<td>554.roms_r</td>
<td>-DSPEC_LP64</td>
</tr>
</tbody>
</table>

### Base Optimization Flags

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

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

**Fortran benchmarks:**
```bash
-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:**
```bash
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte
```
**SPEC CPU2017 Floating Point Rate Result**

**Dell Inc.**
PowerEdge FC640 (Intel Xeon Platinum 8260, 2.40GHz)

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- **Software Availability:** Feb-2019

### 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`

(Continued on next page)
**SPEC CPU2017 Floating Point Rate Result**  
Copyright 2017-2019 Standard Performance Evaluation Corporation

**Dell Inc.**  
PowerEdge FC640 (Intel Xeon Platinum 8260, 2.40GHz)  
**SPECrate2017_fp_base = 239**  
**SPECrate2017_fp_peak = 244**

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

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**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)
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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 2019-05-07 03:20:04-0400.
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