Dell Inc. PowerEdge T640 (Intel Xeon Silver 4208, 2.10GHz)  

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

SPECrates:  
SPECrates2017_fp_base = 91.3
SPECrates2017_fp_peak = 94.2

Hardware

CPU Name: Intel Xeon Silver 4208
Max MHz.: 3200
Nominal: 2100
Enabled: 16 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: 11 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 1.6 TB NVMe SSD
Other: None

Software

OS: Ubuntu 18.04.2 LTS
kernel 4.15.0-45-generic
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 2.2.6 released Apr-2019
File System: ext4
System State: Run level 5 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
**SPEC CPU2017 Floating Point Rate Result**

**Dell Inc.**

PowerEdge T640 (Intel Xeon Silver 4208, 2.10GHz)

**SPECrater2017_fp_base = 91.3**

**SPECrater2017_fp_peak = 94.2**

**Results Table**

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<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
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</tbody>
</table>
| SPECrate2017_fp_base = 91.3

SPECrate2017_fp_peak = 94.2

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

(Continued on next page)
Dell Inc.  
PowerEdge T640 (Intel Xeon Silver 4208, 2.10GHz)  

SPEC CPU2017 Floating Point Rate Result  

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

General Notes (Continued)  

Filesystem page cache synced and cleared with: 
sync; echo 3>/proc/sys/vm/drop_caches  
runcpu command invoked through numaclt i.e.: 
umaclt --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 Tue May 14 22:51:22 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 4208 CPU @ 2.10GHz  
2 "physical id"s (chips)  
32 "processors"  
cores, siblings (Caution: counting these is hw and system dependent. The following  
excerpt from /proc/cpuinfo might not be reliable. Use with caution.)  
cpu cores: 8  
siblings: 16  
physical 0: cores 0 1 2 3 4 5 6 7  
physical 1: cores 0 1 2 3 4 5 6 7  

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

(Continued on next page)
Dell Inc. PowerEdge T640 (Intel Xeon Silver 4208, 2.10GHz)

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Test Date: May-2019
Hardware Availability: Apr-2019
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Platform Notes (Continued)

On-line CPU(s) list: 0–31
Thread(s) per core: 2
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4208 CPU @ 2.10GHz
Stepping: 6
CPU MHz: 1793.450
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30
NUMA node1 CPU(s): 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31
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 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
  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 intel_pinn
  ssbd mba ibrs ibpb ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid
  fsgsbase tsc_adjst bm1 hle avx2 smep bmi2 erms invpcid rtm cmp mpx rdt_a avx512f
  avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
  xsavesopt xsaveopt xgetbv1 xsave xcm l1c qmmx_occup_llc qmmx_mbb_total qmmx_mbb_local
dtherm ida arat pin pts pku ospke avx512_vnni flush_l1d arch_capabilities

From /proc/cpuinfo cache data
  cache size : 11264 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
  node 0 size: 191894 MB
  node 0 free: 190994 MB
  node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31
  node 1 size: 193594 MB
  node 1 free: 192590 MB
  node distances:
    node 0 1
      0: 10 21
      1: 21 10
Dell Inc. PowerEdge T640 (Intel Xeon Silver 4208, 2.10GHz)

**SPEC CPU2017 Floating Point Rate Result**

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**SPECrate2017_fp_base = 91.3**

**SPECrate2017_fp_peak = 94.2**

---

**Platform Notes (Continued)**

From `/proc/meminfo`

<table>
<thead>
<tr>
<th>MemTotal</th>
<th>394677180 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>

```
/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 14 10:03**

**SPEC is set to:** /home/cpu2017

```
Filesystem Type Size Used Avail Use% Mounted on
/dev/nvme0n1p2 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. 2.2.6 04/16/2019**

**Memory:**

12x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2400
12x Not Specified Not Specified

(End of data from sysinfo program)
Dell Inc.

PowerEdge T640 (Intel Xeon Silver 4208, 2.10GHz)

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Compiler Version Notes

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<tr>
<td>Version 19.0.1.144 Build 20181018</td>
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<tr>
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SPEC CPU2017 Floating Point Rate Result

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==============================================================================

### Base Compiler Invocation

C benchmarks:
```sh
icc -m64 -std=c11
```

C++ benchmarks:
```sh
icpc -m64
```

Fortran benchmarks:
```sh
ifort -m64
```

Benchmarks using both Fortran and C:
```sh
ifort -m64 icc -m64 -std=c11
```

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

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

### 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 -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG

(Continued on next page)
## Dell Inc.
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**Base Portability Flags (Continued)**

- 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`

**Peak Compiler Invocation**

### C benchmarks:
- `icc`  
- `-m64`  
- `-std=c11`

### C++ benchmarks:
- `icpc`  
- `-m64`

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

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

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

(Continued on next page)
Dell Inc. PowerEdge T640 (Intel Xeon Silver 4208, 2.10GHz)  

**SPEC CPU2017 Floating Point Rate Result**

**SPECrate2017_fp_base** = 91.3  
**SPECrate2017_fp_peak** = 94.2

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

Peak Optimization Flags (Continued)

503.bwaves_r (continued):  
- 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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