### Dell Inc. PowerEdge T140 (Intel Xeon E-2286G, 4.00 GHz)

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

<table>
<thead>
<tr>
<th>Benchmark</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>38.8</td>
<td>70.6</td>
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<tr>
<td>507.cactuBSSN_r</td>
<td>37.0</td>
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<td>508.namd_r</td>
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<td>510.parest_r</td>
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<td>511.povray_r</td>
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<td>519.lbm_r</td>
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<td>521.wrf_r</td>
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<td>526.blender_r</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>554.roms_r</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon E-2286G
- **Max MHz:** 4900
- **Nominal:** 4000
- **Enabled:** 12 cores, 1 chip
- **Orderable:** 1 chip
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **Cache L2:** 256 KB I+D on chip per core
- **Cache L3:** 12 MB I+D on chip per chip
- **Memory:** 64 GB (4 x 16 GB 2Rx8 PC4-2666V-R)
- **Storage:** 1 x 960 GB SATA SSD
- **Other:** None

**Software**

- **OS:** SUSE Linux Enterprise Server 15 SP1
- **Kernel:** 4.12.14-195-default
- **Compiler:** C/C++: Version 19.0.4.227 of Intel C/C++ Compiler Build 20190416 for Linux;
  Fortran: Version 19.0.4.227 of Intel Fortran Compiler Build 20190416 for Linux
- **Parallel:** No
- **Firmware:** Version 2.1.3 released Nov-2019
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** None
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage.

---

**Test Details**

- **CPU2017 License:** 55
- **Test Sponsor:** Dell Inc.
- **Test Date:** Nov-2019
- **Hardware Availability:** Dec-2019
- **Tested by:** Dell Inc.
- **Software Availability:** Jun-2019

**Software**

- **OS:** SUSE Linux Enterprise Server 15 SP1
- **Kernel:** 4.12.14-195-default
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Dell Inc.

PowerEdge T140 (Intel Xeon E-2286G, 4.00 GHz)

SPECrate®2017_fp_base = 37.4
SPECrate®2017_fp_peak = 39.9

Results Table

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<th>Ratio</th>
<th>Seconds</th>
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<td>11.9</td>
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</tbody>
</table>

SPECrate®2017_fp_base = 37.4
SPECrate®2017_fp_peak = 39.9

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/ODM-SPECcpu2017-194/cpu2017/lib/intel64"

General Notes

Binaries compiled on a system with 1x Intel Core i9-799X 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)
SPEC CPU®2017 Floating Point Rate Result

Dell Inc.

PowerEdge T140 (Intel Xeon E-2286G, 4.00 GHz)

SPECrate®2017_fp_base = 37.4
SPECrate®2017_fp_peak = 39.9

General Notes (Continued)

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.:
umactl --interleave=all runcpu <etc>

Platform Notes

BIOS settings:
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 disabled
PCI ASPM L1 Link Power Management disabled

Sysinfo program /home/cpu2017/ODM-SPECcpu2017-194/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed3b1e6e46a485a0011
running on linux-g3ob Tue Nov 12 18:08:27 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) E-2286G CPU @ 4.00GHz
1 "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 : 12
physical 0: cores 0 1 2 3 4 5

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
Address sizes: 39 bits physical, 48 bits virtual

(Continued on next page)
Dell Inc. PowerEdge T140 (Intel Xeon E-2286G, 4.00 GHz)

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

SPECrater®2017_fp_base = 37.4
SPECrater®2017_fp_peak = 39.9

Test Date: Nov-2019
Hardware Availability: Dec-2019
Software Availability: Jun-2019

CPU(s): 12
On-line CPU(s) list: 0-11
Thread(s) per core: 2
Core(s) per socket: 6
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2286G CPU @ 4.00GHz
Stepping: 10
CPU MHz: 4000.000
BogoMIPS: 8016.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 12288K
NUMA node0 CPU(s): 0-11
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
aperfmpref tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
sdkg fma cx16 xtpr pdcm pclid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer
aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb invpcid_single
pti ssbd ibrs ibpb stibp tpr_shadow vnumi flexpriority ept vpid fsgsbase tsc_adjust
bm1 hle avx2 smep bmi2 erms invpcid rtm mpx rdseed adx smap clflushopt intel_pt
xsaveopt xsavec xgetbv1 xsaves dtherm ida arat pln pts md_clear flush_l1d

/proc/cpuinfo cache data
  cache size: 12288 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
  available: 1 nodes (0)
  node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11
  node 0 size: 64131 MB
  node 0 free: 62597 MB
  node distances:
    node 0
    0: 10

From /proc/meminfo
  MemTotal: 65671032 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

(Continued on next page)
Dell Inc.

PowerEdge T140 (Intel Xeon E-2286G, 4.00 GHz)

SPEC®2017 Floating Point Rate Result
Copyright 2017-2019 Standard Performance Evaluation Corporation

SPECrate®2017_fp_base = 37.4
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CPU2017 License: 55
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Tested by: Dell Inc.

Test Date: Nov-2019
Hardware Availability: Dec-2019
Software Availability: Jun-2019

Platform Notes (Continued)

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

os-release:
NAME="SLES"
VERSION="15-SP1"
VERSION_ID="15.1"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp1"

uname -a:
Linux linux-g3ob 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
ox86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-3620 (L1 Terminal Fault): Mitigation: PTE Inversion
Microarchitectural Data Sampling: Mitigation: Clear CPU buffers; SMT vulnerable
CVE-2017-5754 (Meltdown): Mitigation: PTI
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled
via prctl and seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted
Speculation, IBPB: conditional, IBRS_FW, STIBP: conditional, RSB filling

run-level 3 Nov 12 11:09 last=5

SPEC is set to: /home/cpu2017/ODM-SPECcpu2017-194/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 xfs 440G 36G 405G 9% /

From /sys/devices/virtual/dmi/id
BIOS: Dell Inc. 2.1.3 09/27/2018
Vendor: Dell Inc.
Product: PowerEdge T140
Product Family: PowerEdge

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:
2x 00AD00000A02 HMA82GU7CJR8N-VK 16 GB 2 rank 2666
2x 00AD00000A07 HMA82GU7CJR8N-VK 16 GB 2 rank 2666

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

Dell Inc.  
PowerEdge T140 (Intel Xeon E-2286G, 4.00 GHz)  

SPECrate®2017_fp_base = 37.4  
SPECrate®2017_fp_peak = 39.9

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

Platform Notes (Continued)

(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 19.0.4.227 Build 20190416  
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 19.0.4.227 Build 20190416  
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,  
Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)  
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,  
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Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

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

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PowerEdge T140 (Intel Xeon E-2286G, 4.00 GHz)

SPECrate®2017_fp_base = 37.4

SPECrate®2017_fp_peak = 39.9

Compiler Version Notes (Continued)

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<td>Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416 Copyright (C) 1985-2019 Intel Corporation. All rights reserved.</td>
<td></td>
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Fortran, C | 521.wrf_r(base, peak) 527.cam4_r(base, peak) |

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416 Copyright (C) 1985-2019 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

Base Portability Flags

503.bwaves_r: -DSPEC_LP64

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

**Dell Inc.**

PowerEdge T140 (Intel Xeon E-2286G, 4.00 GHz)

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**CPU2017 License:** 55

**Test Sponsor:** Dell Inc.

**Test Date:** Nov-2019

**Tested by:** Dell Inc.

**Hardware Availability:** Dec-2019

**Software Availability:** Jun-2019

### Base Portability Flags (Continued)

- `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
- `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`

**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 T140 (Intel Xeon E-2286G, 4.00 GHz)

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

Test Date: Nov-2019
Hardware Availability: Dec-2019
Software Availability: Jun-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)
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: 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:
<table>
<thead>
<tr>
<th>SPEC CPU®2017 Floating Point Rate Result</th>
<th>SPECrate®2017_fp_base = 37.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dell Inc.</td>
<td>SPECrate®2017_fp_peak = 39.9</td>
</tr>
<tr>
<td>PowerEdge T140 (Intel Xeon E-2286G, 4.00 GHz)</td>
<td></td>
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<td>CPU2017 License: 55</td>
<td>Test Date: Nov-2019</td>
</tr>
<tr>
<td>Test Sponsor: Dell Inc.</td>
<td>Hardware Availability: Dec-2019</td>
</tr>
<tr>
<td>Tested by: Dell Inc.</td>
<td>Software Availability: Jun-2019</td>
</tr>
</tbody>
</table>

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