# SPEC CPU®2017 Floating Point Rate Result

## Dell Inc.

### PowerEdge T340 (Intel Xeon E-2224G, 3.50 GHz)

<table>
<thead>
<tr>
<th>Copies</th>
<th>SPECrate®2017_fp_base</th>
<th>SPECrate®2017_fp_peak</th>
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</thead>
<tbody>
<tr>
<td>4</td>
<td>31.3</td>
<td>30.5</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon E-2224G
- **Max MHz:** 4700
- **Nominal:** 3500
- **Enabled:** 4 cores, 1 chip
- **Orderable:** 1 chip
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 256 KB I+D on chip per core
- **L3:** 8 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
- **Compiler:** C/C++: Version 19.0.4.227 of Intel C/C++ Compiler Build 20190416 for Linux;
- **Parallel:** No
- **Firmware:** Version 2.1.5 released Nov-2019
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** None

---

**Test Date:** Oct-2019  
**Hardware Availability:** Dec-2019  
**Software Availability:** Jun-2019
## Results Table

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**SPECrate®2017_fp_base = 31.3**

**SPECrate®2017_fp_peak = 30.5**

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"

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/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.

(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:
  - 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
  - CPU Interconnect Bus Link Power Management enabled
  - PCI ASPM L1 Link Power Management enabled

- Sysinfo program:
  `/home/cpu2017/bin/sysinfo`

- Rev: r6365 of 2019-08-21 295195f888a3d7edbe6e46a485a0011
- running on linux-g3ob Wed Oct 30 12:28:04 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](https://www.spec.org/cpu2017/Docs/config.html#sysinfo)

From `/proc/cpuinfo`

```
model name : Intel(R) Xeon(R) E-2224G CPU @ 3.50GHz
  1 "physical id"s (chips)
  4 "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 : 4
  siblings : 4
  physical 0: cores 0 1 2 3
```

From `lscpu`:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
```
Platform Notes (Continued)

Byte Order:          Little Endian
Address sizes:       39 bits physical, 48 bits virtual
CPU(s):              4
On-line CPU(s) list: 0-3
Thread(s) per core:  1
Core(s) per socket:  4
Socket(s):           1
NUMA node(s):        1
Vendor ID:           GenuineIntel
CPU family:          6
Model:               158
Model name:          Intel(R) Xeon(R) E-2224G CPU @ 3.50GHz
Stepping:            10
CPU MHz:             3500.000
BogoMIPS:            7008.00
Virtualization:      VT-x
L1d cache:           32K
L1i cache:           32K
L2 cache:            256K
L3 cache:            8192K
NUMA node0 CPU(s):   0-3
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
aperfmpref perf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 sse3
sdbe fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer
aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb invpcid_single
pti ssbd ibrs ibpb stibp tpr_shadow vmmr flexpriority ept vpid fsgsbase tsc_adjust
bm1 hle avx2 smep bmi2 ersed invpcl rtm mpx rdseed adx smap clflushopt intel_pt
xsaveopt xsavec xgetbv1 xsaves dtherm ida arat pln pts md_clear flush_l1d

From /proc/cpuinfo cache data
  cache size : 8192 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
  node 0 size: 64259 MB
  node 0 free: 63005 MB
  node distances:
  node 0
     0: 10

From /proc/meminfo
  MemTotal:  65801564 kB
  HugePages_Total:  0
**Dell Inc.**  
PowerEdge T340 (Intel Xeon E-2224G, 3.50 GHz)  

**SPECrate®2017_fp_base = 31.3**  
**SPECrate®2017_fp_peak = 30.5**  

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

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### Platform Notes (Continued)

- **Hugepage size:** 2048 kB
- 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)  
  x86_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 disabled
  - 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: disabled, RSB filling

- **run-level 3 Oct 30 06:50 last=5**

- **SPEC is set to:** /home/cpu2017  
  - Filesystem       Type  Size  Used Avail Use% Mounted on
  - /dev/sda2        xfs  440G  27G  413G  7%  /

- **BIOS:** Dell Inc. 2.1.5 09/27/2018  
  - Vendor: Dell Inc.  
  - Product: PowerEdge T340  
  - 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

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

Dell Inc.
PowerEdge T340 (Intel Xeon E-2224G, 3.50 GHz)

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

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

Platform Notes (Continued)

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

(End of data from sysinfo program)

Compiler Version Notes

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<th>C</th>
<th>519.lbm_r(base, peak) 538.imagick_r(base, peak)</th>
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<tr>
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<td>Version 19.0.4.227 Build 20190416</td>
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SPECrated2017_fp_base = 31.3
SPECrated2017_fp_peak = 30.5

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

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

Compiler Version Notes (Continued)

------------------------------------------------------------------------------
Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base, peak)
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Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
Fortran, C      | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
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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.
------------------------------------------------------------------------------

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
Dell Inc.

PowerEdge T340 (Intel Xeon E-2224G, 3.50 GHz)

SPECrates 2017_fp_base = 31.3
SPECrates 2017_fp_peak = 30.5

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

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:
-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
## Dell Inc.

**PowerEdge T340 (Intel Xeon E-2224G, 3.50 GHz)**

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### 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:
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Tested with SPEC CPU®2017 v1.1.0 on 2019-10-30 12:28:04-0400.