Dell Inc.

PowerEdge T340 (Intel Xeon E-2288G, 3.70 GHz)  

| SPECspeed®2017_fp_peak = 31.1 | SPECspeed®2017_fp_base = 30.8 |

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

<table>
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<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base (30.8)</th>
<th>SPECspeed®2017_fp_peak (31.1)</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>8</td>
<td>(43.0)</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>8</td>
<td>(43.0)</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>8</td>
<td>(15.6)</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>8</td>
<td>(15.6)</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>8</td>
<td>(26.2)</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>8</td>
<td>(26.2)</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>8</td>
<td>(23.8)</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>8</td>
<td>(33.6)</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>8</td>
<td>(17.3)</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>8</td>
<td>(17.6)</td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon E-2288G  
- **Max MHz:** 5000  
- **Nominal:** 3700  
- **Enabled:** 8 cores, 1 chip, 2 threads/core  
- **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:** 16 MB I+D on chip per chip  
- **Other:** None  
- **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:** Yes  
- **Firmware:** Version 2.1.6 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.
SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Dell Inc.

PowerEdge T340 (Intel Xeon E-2288G, 3.70 GHz)

SPECspeed®2017_fp_base = 30.8
SPECspeed®2017_fp_peak = 31.1

CPU2017 License: 55
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Test Date: Nov-2019
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
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<td>528</td>
<td>17.3</td>
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<td>17.3</td>
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<td>654.roms_s</td>
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<td>17.6</td>
<td>894</td>
<td>17.6</td>
<td>894</td>
<td>17.6</td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-799X 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
Dell Inc.  
PowerEdge T340 (Intel Xeon E-2288G, 3.70 GHz)  

<table>
<thead>
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<tr>
<td>Tested by: Dell Inc.</td>
<td>Software Availability: Aug-2019</td>
</tr>
</tbody>
</table>

**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
- PCI ASPM L1 Link Power Management disabled
- Logical Processor enabled

Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r6365 of 2019-08-21 295195f888a3d7edbl1e6e46e485a0011  
running on linux-g3ob Thu Nov 21 18:15:08 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-2288G CPU @ 3.70GHz
- L1 cache 16 "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: 8
  - siblings: 16
  - physical 0: 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
- Address sizes: 39 bits physical, 48 bits virtual
- CPU(s): 16
- On-line CPU(s) list: 0-15
- Thread(s) per core: 2
- Core(s) per socket: 8
- Socket(s): 1
- NUMA node(s): 1
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 158
- Model name: Intel(R) Xeon(R) E-2288G CPU @ 3.70GHz
- Stepping: 13

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

**Dell Inc.**

**PowerEdge T340 (Intel Xeon E-2288G, 3.70 GHz)**

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**CPU2017 License:** 55  
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### Platform Notes (Continued)

```
CPU MHz:             3700.000
BogoMIPS:            7392.00
Virtualization:      VT-x
L1d cache:           32K
L1i cache:           32K
L2 cache:            256K
L3 cache:            16384K
NUMA node0 CPU(s):   0-15
```

### 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
pdpte1gb  mce  cmov  pat  pse36  clflush  dts  acpi  mmx  fxsr  sse  sse2  ss  ht
tm  pbe  syscall  nx
```

```
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 12 13 14 15
   node 0 size: 64131 MB
   node 0 free: 56308 MB
   node distances:
   node 0
   0:  10
```

```
From /proc/meminfo
   MemTotal:       65670280 kB
   HugePages_Total:       0
   Hugepagesize:       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"
```

(Continued on next page)
Dell Inc. PowerEdge T340 (Intel Xeon E-2288G, 3.70 GHz)

SPECspeed®2017_fp_base = 30.8
SPECspeed®2017_fp_peak = 31.1

CPU2017 License: 55
Test Date: Nov-2019
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Software Availability: Aug-2019

Platform Notes (Continued)

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): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected
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: Enhanced IBRS, IBPB: conditional, RSB filling

run-level 3 Nov 21 15:27 last=5

SPEC is set to: /home/cpu2017

From /sys/devices/virtual/dmi/id
BIOS: Dell Inc. 2.1.6 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 0OAD00000A02 HMA82GU7CJR8N-VK 16 GB 2 rank 2666
  2x 0OAD00000A07 HMA82GU7CJR8N-VK 16 GB 2 rank 2666

(End of data from sysinfo program)

Compiler Version Notes

C 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,
Version 19.0.4.227 Build 20190416

(Continued on next page)
Dell Inc.
PowerEdge T340 (Intel Xeon E-2288G, 3.70 GHz)

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Compiler Version Notes (Continued)

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---
C++, C, Fortran | 607.cactuBSSN_s(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, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

---
Fortran | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
654.roms_s(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.

---
Fortran, C | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
628.pop2_s(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.

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

Fortran benchmarks:
ifort -m64

(Continued on next page)
Dell Inc.

PowerEdge T340 (Intel Xeon E-2288G, 3.70 GHz)

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

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**CPU2017 License:** 55  
**Test Date:** Nov-2019  
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---

### Base Compiler Invocation (Continued)

**Benchmarks using both Fortran and C:**

```bash
ifort -m64 icc -m64 -std=c11
```

**Benchmarks using Fortran, C, and C++:**

```bash
icpc -m64 icc -m64 -std=c11 ifort -m64
```

---

### Base Portability Flags

- `603.bwaves_s`: `-DSPEC_LP64`
- `607.cactuBSSN_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:**

```bash
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
```

**Fortran benchmarks:**

```bash
-DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
```

**Benchmarks using both Fortran and C:**

```bash
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
```

**Benchmarks using Fortran, C, and C++:**

```bash
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
```

---

Base Compiler Invocation (Continued)

Benchmarks using both Fortran and C:

```bash
ifort -m64 icc -m64 -std=c11
```

Benchmarks using Fortran, C, and C++:

```bash
icpc -m64 icc -m64 -std=c11 ifort -m64
```
## Dell Inc.

**PowerEdge T340 (Intel Xeon E-2288G, 3.70 GHz)**

### SPEC CPU®2017 Floating Point Speed Result

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### Peak Compiler Invocation

C benchmarks:

```plaintext
icc -m64 -std=c11
```

Fortran benchmarks:

```plaintext
ifort -m64
```

Benchmarks using both Fortran and C:

```plaintext
ifort -m64 icc -m64 -std=c11
```

Benchmarks using Fortran, C, and C++:

```plaintext
icpc -m64 icc -m64 -std=c11 ifort -m64
```

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

C benchmarks:

```plaintext
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
```

Fortran benchmarks:

1. `603.bwaves_s`:
   ```plaintext
   -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP
   -DSPEC_OPENMP -O2 -xCORE-AVX2 -qopt-prefetch -ipo -O3
   -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=4
   -qopenmp -nostandard-realloc-lhs
   ```

2. `649.fotonik3d_s`:
   ```plaintext
   Same as 603.bwaves_s
   ```

3. `654.roms_s`:
   ```plaintext
   -DSPEC_OPENMP -xCORE-AVX2 -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:

```plaintext
621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs
```

(Continued on next page)
Dell Inc.

PowerEdge T340 (Intel Xeon E-2288G, 3.70 GHz)  

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**Peak Optimization Flags (Continued)**

627.cam4_s: -xCORE-AVX2 -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-AVX2 -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:
