SPEC CPU®2017 Floating Point Speed Result

Dell Inc.

PowerEdge T140 (Intel Xeon E-2246G, 3.60 GHz)

| SPECspeed®2017_fp_base = 26.1 |
| SPECspeed®2017_fp_peak = 26.5 |

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

78.5

 Threads

<table>
<thead>
<tr>
<th>Spec Speed</th>
<th>603.bwaves_s</th>
<th>607.cactuBSSN_s</th>
<th>619.lbm_s</th>
<th>621.wrf_s</th>
<th>627.cam4_s</th>
<th>628.pop2_s</th>
<th>638.imagick_s</th>
<th>644.nab_s</th>
<th>649.fotonik3d_s</th>
<th>654.roms_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_base (26.1)</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
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<tr>
<td>SPECspeed®2017_fp_peak (26.5)</td>
<td>34.0</td>
<td>33.9</td>
<td>15.1</td>
<td>33.8</td>
<td>20.4</td>
<td>20.4</td>
<td>17.1</td>
<td>39.0</td>
<td>16.9</td>
<td>16.1</td>
</tr>
</tbody>
</table>

78.5

Hardware

CPU Name: Intel Xeon E-2246G
Max MHz: 4800
Nominal: 3600
Enabled: 12 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: 12 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

**Dell Inc.**

PowerEdge T140 (Intel Xeon E-2246G, 3.60 GHz)

**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
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<th>Benchmark</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>751</td>
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<td>752</td>
<td>78.5</td>
<td>6</td>
<td>751</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
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<td>490</td>
<td>34.1</td>
<td>490</td>
<td>34.0</td>
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<td>491</td>
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<tr>
<td>619.lbm_s</td>
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<td>15.1</td>
<td>348</td>
<td>15.1</td>
<td>6</td>
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<tr>
<td>621.wrf_s</td>
<td>6</td>
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<td>34.1</td>
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<tr>
<td>627.cam4_s</td>
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<td>20.4</td>
<td>6</td>
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<tr>
<td>628.pop2_s</td>
<td>6</td>
<td>402</td>
<td>29.5</td>
<td>401</td>
<td>29.6</td>
<td>6</td>
<td>372</td>
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<td>638.imagick_s</td>
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<td>841</td>
<td>17.1</td>
<td>843</td>
<td>17.1</td>
<td>6</td>
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<tr>
<td>644.nab_s</td>
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<td>446</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>16.9</td>
<td>6</td>
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<tr>
<td>654.roms_s</td>
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<td>16.3</td>
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<td>16.1</td>
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<td>972</td>
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</tbody>
</table>

**SPECspeed®2017_fp_base =** 26.1  
**SPECspeed®2017_fp_peak =** 26.5

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/ODM-SPECcpu2017-194/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
- 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) 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:
  
  ```bash
  sync; echo 3 > /proc/sys/vm/drop_caches
  ```
Dell Inc.

PowerEdge T140 (Intel Xeon E-2246G, 3.60 GHz)

SPEC CPU®2017 Floating Point Speed Result

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Dell Inc.

SPECspeed®2017_fp_base = 26.1

SPECspeed®2017_fp_peak = 26.5

CPU2017 License:
Test Sponsor:
Tested by:

Dell Inc.

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 disabled

Sysinfo program /home/cpu2017/ODM-SPECcpu2017-194/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011
running on linux-g3ob Tue Dec 3 13:17:26 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-2246G CPU @ 3.60GHz
  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
CPU(s): 12
On-line CPU(s) list: 0-11
Thread(s) per core: 2
Core(s) per socket: 6
Socket(s):
NUMA node(s):
Vendor ID:
GenuineIntel
CPU family:
6
Model:
158
Model name:
Intel(R) Xeon(R) E-2246G CPU @ 3.60GHz
Stepping:
10

(Continued on next page)
Dell Inc.

PowerEdge T140 (Intel Xeon E-2246G, 3.60 GHz)

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

SPECspeed®2017_fp_base = 26.1
SPECspeed®2017_fp_peak = 26.5

Platform Notes (Continued)

CPU MHz: 3600.000
BogoMIPS: 7200.00
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 art 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
dbg fma cx16 xtpr pdcm pcid 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 vnmi flexpriority ept vpid fsgsbase tsc_adjust
bmi1 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: 64257 MB
  node 0 free: 56379 MB
  node distances:
  node 0
    0: 10

From /proc/meminfo
  MemTotal: 65800056 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 T140** (Intel Xeon E-2246G, 3.60 GHz)

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

#### Platform Notes (Continued)

```bash
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 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

```bash
run-level 3 Dec 3 09:29 last=5
```

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

**Filesystem** | **Type** | **Size** | **Used** | **Avail** | **Use%** | **Mounted on**
--- | --- | --- | --- | --- | --- | ---
/dev/sda2 | xfs | 440G | 42G | 399G | 10% | /

From /sys/devices/virtual/dmi/id

- **BIOS:** Dell Inc. 2.1.6 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

(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 T140 (Intel Xeon E-2246G, 3.60 GHz)

CPU2017 License: 55
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Tested by: Dell Inc.

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

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.
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

Fortran benchmarks:
ifort -m64

(Continued on next page)
## Dell Inc.

**PowerEdge T140 (Intel Xeon E-2246G, 3.60 GHz)**

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<tr>
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- **Test Sponsor:** Dell Inc.
- **Test Date:** Dec-2019
- **Hardware Availability:** Dec-2019
- **Tested by:** Dell Inc.
- **Software Availability:** Jun-2019

### Base Compiler Invocation (Continued)

Benchmarks using both Fortran and C:

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

Benchmarks using Fortran, C, and C++:

```
icp -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:**

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

**Fortran benchmarks:**

```-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:

```-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -DSPEC/OpenMP
-nostandard-realloc-lhs```

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```
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**Tested by:** Dell Inc.  
**Hardware Availability:** Dec-2019  
**Software Availability:** Jun-2019

### Peak Compiler Invocation

**C benchmarks:**
```bash
icc -m64 -std=c11
```

**Fortran benchmarks:**
```bash
ifort -m64
```

**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
```

### Peak Portability Flags

Same as Base Portability Flags

### Peak 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:**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Options</th>
</tr>
</thead>
</table>
| 603.bwaves_s | `-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
```

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Options</th>
</tr>
</thead>
</table>
| 649.fotonik3d_s | Same as 603.bwaves_s
```

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Options</th>
</tr>
</thead>
</table>
| 654.roms_s | `-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:**

<table>
<thead>
<tr>
<th>Benchmark</th>
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</thead>
</table>
| 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 T140 (Intel Xeon E-2246G, 3.60 GHz)

SPECspeed\textsuperscript{®}2017\textsuperscript{fp}_base = 26.1

SPECspeed\textsuperscript{®}2017\textsuperscript{fp}_peak = 26.5

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

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

Peak Optimization Flags (Continued)

627.cam4_s: -xCORE-AVX2 -ipo -03 -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 -03 -no-prec-div -qopt-prefetch -ffinite-math-only
-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:

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU\textsuperscript{®}2017 v1.1.0 on 2019-12-03 14:17:25-0500.
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