Dell Inc.

PowerEdge T350 (Intel Xeon E-2334, 3.40 GHz)

**SPECspeed®2017_fp_base = 33.2**

**SPECspeed®2017_fp_peak = 33.9**

---

**Software**

- **OS:** Red Hat Enterprise Linux 8.4 (Ootpa) 4.18.0-305.el8.x86_64
- **Compiler:** C/C++: Version 2021.1 of Intel oneAPI DPC++/C++
  - Compiler Build 20201113 for Linux;
  - Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux;
  - C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux
- **Parallel:** Yes
- **Firmware:** Version 1.0.1 released Aug-2021
- **File System:** tmpfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** jemalloc memory allocator V5.0.1
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage.

---

**Hardware**

- **CPU Name:** Intel Xeon E-2334
- **Max MHz:** 4800
- **Nominal:** 3400
- **Enabled:** 4 cores, 1 chip, 2 threads/core
- **Orderable:** 1 chip
- **Cache L1:** 32 KB I + 48 KB D on chip per core
  - L2: 512 KB I+D on chip per core
  - L3: 8 MB I+D on chip per chip
- **Other:** None
- **Memory:** 64 GB (2 x 32 GB 2Rx8 PC4-3200AA-E)
- **Storage:** 70 GB on tmpfs
- **Other:** None

---

**Threads**

<table>
<thead>
<tr>
<th>Thread</th>
<th>Threads</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>4</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>4</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>4</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>4</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>4</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>4</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>4</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>4</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>4</td>
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<tr>
<td>654.roms_s</td>
<td>4</td>
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</tbody>
</table>

**SPECspeed®2017_fp_base (33.2)**

**SPECspeed®2017_fp_peak (33.9)**
Dell Inc.
PowerEdge T350 (Intel Xeon E-2334, 3.40 GHz)

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

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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<th>Seconds</th>
<th>Ratio</th>
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<tr>
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<td>20.2</td>
<td>782</td>
<td>20.1</td>
<td>782</td>
</tr>
</tbody>
</table>

SPECspeed\textsubscript{2017} \text{fp_base} = 33.2
SPECspeed\textsubscript{2017} \text{fp_peak} = 33.9

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,1,0"
LD\_LIBRARY\_PATH = "/mnt/ramdisk/cpu2017-1.1.8-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.8-ic2021.1/je5.0.1-64"
MALLOCS\_CONF = "retain:true"
OMP\_STACK\_SIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0
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
jemalloc, a general purpose malloc implementation built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

(Continued on next page)
Dell Inc.
PowerEdge T350 (Intel Xeon E-2334, 3.40 GHz)

**SPECspeed®2017_fp_base = 33.2**
**SPECspeed®2017_fp_peak = 33.9**

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>55</th>
<th>Test Date:</th>
<th>Sep-2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Dell Inc.</td>
<td>Hardware Availability:</td>
<td>Oct-2021</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Dell Inc.</td>
<td>Software Availability:</td>
<td>May-2021</td>
</tr>
</tbody>
</table>

**General Notes (Continued)**

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.

Benchmark run from a 70 GB ramdisk created with the cmd: "mount -t tmpfs -o size=70G tmpfs /mnt/ramdisk"

**Platform Notes**

BIOS settings:
- Virtualization Technology: Disabled
- System Profile: Custom
- CPU Power Management: Maximum Performance
- C1E: Disabled
- C States: Autonomous
- PCI ASPM L1 Link
- Power Management: Disabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.8-ic2021.1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca61c64d
running on localhost.localdomain Sun Sep  5 19:46:50 2021

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-2334 CPU @ 3.40GHz
  - 1 "physical id"s (chips)
    - 8 "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: 8
    - physical 0: cores 0 1 2 3

From lscpu from util-linux 2.32.1:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 8
- On-line CPU(s) list: 0-7
- Thread(s) per core: 2
- Core(s) per socket: 4

(Continued on next page)
Dell Inc.  
PowerEdge T350 (Intel Xeon E-2334, 3.40 GHz)  

<table>
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CPU2017 License: 55  
Test Sponsor: Dell Inc.  
Tested by: Dell Inc.  

Test Date: Sep-2021  
Hardware Availability: Oct-2021  
Software Availability: May-2021

### Platform Notes (Continued)

- **Socket(s):** 1  
- **NUMA node(s):** 1  
- **Vendor ID:** GenuineIntel  
- **BIOS Vendor ID:** Intel  
- **CPU family:** 6  
- **Model:** 167  
- **Model name:** Intel(R) Xeon(R) E-2334 CPU @ 3.40GHz  
- **BIOS Model name:** Intel(R) Xeon(R) E-2334 CPU @ 3.40GHz  
- **Stepping:** 1  
- **CPU MHz:** 4600.000  
- **BogoMIPS:** 6816.00  
- **Virtualization:** VT-x  
- **L1d cache:** 48K  
- **L1i cache:** 32K  
- **L2 cache:** 512K  
- **L3 cache:** 8192K  
- **NUMA node0 CPU(s):** 0-7  
- **Flags:** fpu vme de pse tsc msr pae mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpesgb rdtscp lm constant_tsc art arch_perfmon pbs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperv tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg 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 invpcid_single ssbd ibrs ibpb stibp ibrs_enabled fsgsgbase tsc_adjust bmi1 avx2 smep bmi2 erms invpcid mxp avx512f avx512dq rdseed adx smap avx512ifma clflushopt intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsavec xsavec xsaveopt xsaves dtherm ida arat pln pts avx512vpmi ump pkx ospke avx512_vbmi2 gfn vaes vpclmulqdq avx512_vnni avx512_vbag avx512_vpopcntdq rdpid fsrm md_clear flush_l1d arch_capabilities

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  
node 0 size: 64029 MB  
node 0 free: 34568 MB  
node distances:  
node 0 0: 10

From /proc/meminfo  
MemTotal: 65566380 kB  
HugePages_Total: 0  
Hugepagesize: 2048 kB

(Continued on next page)
**Dell Inc.**

PowerEdge T350 (Intel Xeon E-2334, 3.40 GHz)

<table>
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<tbody>
<tr>
<td>33.2</td>
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Sep-2021
Hardware Availability: Oct-2021
Tested by: Dell Inc.
Software Availability: May-2021

<table>
<thead>
<tr>
<th>Platform Notes (Continued)</th>
</tr>
</thead>
</table>

/sbin/tuned-adm active
Current active profile: throughput-performance

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

   os-release:
      NAME="Red Hat Enterprise Linux"
      VERSION="8.4 (Ootpa)"
      ID="rhel"
      ID_LIKE="fedora"
      VERSION_ID="8.4"
      PLATFORM_ID="platform:el8"
      PRETTY_NAME="Red Hat Enterprise Linux 8.4 (Ootpa)"
      ANSI_COLOR="0;31"

redhat-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.4:ga

uname -a:
   Linux localhost.localdomain 4.18.0-305.el8.x86_64 #1 SMP Thu Apr 29 08:54:30 EDT 2021
   x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit): Not affected
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: usercopy/swaps barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Sep 5 07:11

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-ic2021.1

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>tmpfs</td>
<td>tmpfs</td>
<td>70G</td>
<td>24G</td>
<td>47G</td>
<td>34%</td>
<td>/mnt/ramdisk</td>
</tr>
</tbody>
</table>

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge T350

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

Dell Inc.

PowerEdge T350 (Intel Xeon E-2334, 3.40 GHz)

SPECspeed®2017_fp_base = 33.2
SPECspeed®2017_fp_peak = 33.9

CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Sep-2021
Tested by: Dell Inc.
Hardware Availability: Oct-2021
Software Availability: May-2021

Platform Notes (Continued)

Product Family: PowerEdge
Serial: B50KFF3

Additional information from dmidecode 3.2 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 00CE00000C01 M391A4G43AB1-CWE 32 GB 2 rank 3200

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 1.0.1
BIOS Date: 08/18/2021
BIOS Revision: 1.0

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
| C                        | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base) |
------------------------------------------------------------------------------
| Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000 |
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.                |
------------------------------------------------------------------------------

------------------------------------------------------------------------------
| C                        | 644.nab_s(peak) |
------------------------------------------------------------------------------
| Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113 |
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.                |
------------------------------------------------------------------------------

------------------------------------------------------------------------------
| C                        | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base) |
------------------------------------------------------------------------------
| Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000 |
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.                |
------------------------------------------------------------------------------

(Continued on next page)
Dell Inc.

PowerEdge T350 (Intel Xeon E-2334, 3.40 GHz)

SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

SPECspeed®2017_fp_base = 33.2
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Dell Inc.  Test Sponsor: Dell Inc.
PowerEdge T350 (Intel Xeon E-2334, 3.40 GHz)  Tested by: Dell Inc.

Compiler Version Notes (Continued)

==============================================================================
C               | 644.nab_s(peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 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 Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
==============================================================================
Fortran, C      | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
                   | 628.pop2_s(base, peak)
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Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
## Dell Inc.

PowerEdge T350 (Intel Xeon E-2334, 3.40 GHz)

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<tr>
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<td><strong>Software Availability:</strong> May-2021</td>
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### Base Compiler Invocation

- **C benchmarks:**
  - icc

- **Fortran benchmarks:**
  - ifort

- **Benchmarks using both Fortran and C:**
  - ifort icc

- **Benchmarks using Fortran, C, and C++:**
  - icpc icc ifort

### 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:**
  - -m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
  - -ffinite-math-only -qopt-mem-layout-trans=4 -gopenmp -DSPEC_OPENMP
  - -mbranches-within-32B-boundaries

- **Fortran benchmarks:**
  - -m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3
  - -no-prec-div -qopt-prefetch -ffinite-math-only
  - -qopt-mem-layout-trans=4 -gopenmp -nostandard-realloc-lhs
  - -mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib
    -ljemalloc

- **Benchmarks using both Fortran and C:**
  - -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
**Dell Inc.**

**PowerEdge T350 (Intel Xeon E-2334, 3.40 GHz)**

<table>
<thead>
<tr>
<th>SPECspeed(^{\text{®}2017}) fp_base</th>
<th>SPECspeed(^{\text{®}2017}) fp_peak</th>
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**CPU2017 License:** 55

**Test Sponsor:** Dell Inc.

**Tested by:** Dell Inc.

**Test Date:** Sep-2021

**Hardware Availability:** Oct-2021

**Software Availability:** May-2021

---

### Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
- `--qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp`
- `--DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs`
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

Benchmarks using Fortran, C, and C++:
- `-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
- `--qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp`
- `--DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs`
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

---

### Peak Compiler Invocation

C benchmarks (except as noted below):

- `icc`

- `644.nab_s`: `icx`

Fortran benchmarks:

- `ifort`

Benchmarks using both Fortran and C:

- `ifort icc`

Benchmarks using Fortran, C, and C++:

- `icpc icc ifort`

---

### Peak Portability Flags

Same as Base Portability Flags

---

### Peak Optimization Flags

C benchmarks:

- `619.lbm_s`: `basepeak = yes`

- `638.imagick_s`: `basepeak = yes`

(Continued on next page)
**Dell Inc.**

**PowerEdge T350 (Intel Xeon E-2234, 3.40 GHz)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base = 33.2</th>
<th>SPECspeed®2017_fp_peak = 33.9</th>
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<td><strong>CPU2017 License:</strong> 55</td>
<td><strong>Test Date:</strong> Sep-2021</td>
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</tbody>
</table>

### Peak Optimization Flags (Continued)

644.nab_s: -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
   -flto -mfpmath=sse -funroll-loops -fopenmp
   -DSPEC_OPENMP -qopt-mem-layout-trans=4
   -fimf-accuracy-bits=14:sqrt
   -mbranches-within-32B-boundaries
   -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

**Fortran benchmarks:**

603.bwaves_s: basepeak = yes
649.fotonik3d_s: basepeak = yes
654.roms_s: basepeak = yes

**Benchmarks using both Fortran and C:**

621.wrf_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
   -prof-use(pass 2) -ipo -xCORE-AVX512 -O3 -no-prec-div
   -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4
   -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
   -mbranches-within-32B-boundaries -nostandard-realloc-lhs
   -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

627.cam4_s: basepeak = yes
628.pop2_s: basepeak = yes

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

607.cactusBSSN_s: basepeak = yes

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:

http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml

http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-ICX-rev1.4.xml
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.
PowerEdge T350 (Intel Xeon E-2334, 3.40 GHz)

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