## SPEC CPU®2017 Floating Point Speed Result

**Dell Inc.**

**PowerEdge C6520 (Intel Xeon Gold 6330, 2.00 GHz)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>176</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>177</td>
</tr>
</tbody>
</table>

### CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Apr-2021

Hardware Availability: Apr-2021

Software Availability: Dec-2020

---

### Hardware

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base (176)</th>
<th>SPECspeed®2017_fp_peak (177)</th>
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<tbody>
<tr>
<td>603.bwaves_s 112</td>
<td>204</td>
<td>537</td>
</tr>
<tr>
<td>607.cactuBSSN_s 112</td>
<td>122</td>
<td>382</td>
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<tr>
<td>619.lbm_s 112</td>
<td>151</td>
<td>347</td>
</tr>
<tr>
<td>621.wrf_s 112</td>
<td>148</td>
<td>207</td>
</tr>
<tr>
<td>627.cam4_s 112</td>
<td>149</td>
<td>207</td>
</tr>
<tr>
<td>628.pop2_s 112</td>
<td>77.2</td>
<td>207</td>
</tr>
<tr>
<td>638.imagick_s 112</td>
<td>151</td>
<td>207</td>
</tr>
<tr>
<td>644.nab_s 112</td>
<td>99.5</td>
<td>207</td>
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<tr>
<td>649.fotonik3d_s 112</td>
<td>99.1</td>
<td>207</td>
</tr>
<tr>
<td>654.roms_s 112</td>
<td>30.0</td>
<td>610</td>
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</tbody>
</table>

### Software

- **OS:** Red Hat Enterprise Linux 8.3 (Ootpa) 4.18.0-240.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 1.1.2 released Apr-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.
## Dell Inc.

### PowerEdge C6520 (Intel Xeon Gold 6330, 2.00 GHz)

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<tr>
<th>CPU2017 License: 55</th>
<th>Test Date: Apr-2021</th>
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<td>Software Availability: Dec-2020</td>
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### Results Table

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<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
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<td>644.nab_s</td>
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<td><strong>50.3</strong></td>
<td><strong>347</strong></td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>654.roms_s</td>
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<td><strong>76.2</strong></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 176
SPECspeed®2017_fp_peak = 177

### 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 = "/mnt/ramdisk/cpu2017-1.1.7-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.7-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.7-ic2021.1/lib/intel64"
- MALLOC_CONF = "retain:true"
- OMP_STACKSIZE = "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

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

Dell Inc.

PowerEdge C6520 (Intel Xeon Gold 6330, 2.00 GHz)

SPECspeed®2017_fp_base = 176

SPECspeed®2017_fp_peak = 177

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

Test Date: Apr-2021
Hardware Availability: Apr-2021
Software Availability: Dec-2020

General Notes (Continued)

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.

Benchmark run from a 125 GB ramdisk created with the cmd: "mount -t tmpfs -o size=125G tmpfs /mnt/ramdisk"

Platform Notes

BIOS Settings:
  Virtualization Technology : Disabled
  System Profile : Custom
  CPU Power Management : Maximum Performance
  C1E : Disabled
  C States : Autonomous
  Memory Patrol Scrub : Disabled
  Energy Efficiency Policy : Performance
  CPU Interconnect Bus Link
    Power Management : Disabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.7-ic2021.1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Wed Apr 28 12:41:46 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) Gold 6330 CPU @ 2.00GHz
  2  "physical id”s (chips)
  112 "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 : 28
    siblings : 56
    physical 0: cores 0 1 2 3 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
    physical 1: cores 0 1 2 3 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

From lscpu:
  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit

(Continued on next page)
**Platform Notes (Continued)**

<table>
<thead>
<tr>
<th>Byte Order:</th>
<th>Little Endian</th>
</tr>
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<tbody>
<tr>
<td>CPU(s):</td>
<td>112</td>
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<tr>
<td>On-line CPU(s) list:</td>
<td>0-111</td>
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<tr>
<td>Thread(s) per core:</td>
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<tr>
<td>Core(s) per socket:</td>
<td>28</td>
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<tr>
<td>Socket(s):</td>
<td>2</td>
</tr>
<tr>
<td>NUMA node(s):</td>
<td>2</td>
</tr>
<tr>
<td>Vendor ID:</td>
<td>GenuineIntel</td>
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<tr>
<td>CPU family:</td>
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<tr>
<td>Model:</td>
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<tr>
<td>Model name:</td>
<td>Intel(R) Xeon(R) Gold 6330 CPU @ 2.00GHz</td>
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<tr>
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<td>L1d cache:</td>
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<tr>
<td>L1i cache:</td>
<td>32K</td>
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<tr>
<td>L2 cache:</td>
<td>1280K</td>
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<tr>
<td>L3 cache:</td>
<td>43008K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s):</td>
<td>0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62,64,66,68,70,72,74,76,78,80,82,84,86,88,90,92,94,96,98,100,102,104,106,108,110</td>
</tr>
<tr>
<td>NUMA node1 CPU(s):</td>
<td>1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63,65,67,69,71,73,75,77,79,81,83,85,87,89,91,93,95,97,99,101,103,105,107,109,111</td>
</tr>
<tr>
<td>Flags:</td>
<td>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 pdtpeb rtstsp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop-tsc cpuid aperfpmpref pni pclmulqdq dtes64 monitor ds_cpl vmx est tm2 ssse3 sdbg fma cx16 xtrpm cdc pdcd dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single intel_pni ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgrbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cmqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsavec xsaveopt xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local split_lock Detect wbinvd dtengm ida arat pln pts avx512vbm2 umip pku ospke avx512_vmb2 gfni vaes vpcmulqdq avx512_vni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfal flush_lld arch_capabilities</td>
</tr>
</tbody>
</table>

/proc/cpuinfo cache data  
cache size: 43008 KB

From numactl --cache data WARNING: a numactl 'node' might or might not correspond to a physical chip.  
available: 2 nodes (0-1)  
node 0 cpus: 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 100 102 104 106

(Continued on next page)
Platform Notes (Continued)

108 110
node 0 size: 240756 MB	node 0 free: 208117 MB
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51
53 55 57 59 61 63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93 95 97 99 101 103 105 107
109 111
node 1 size: 243453 MB	node 1 free: 221877 MB
node distances:
node 0 1
0: 10 20
1: 20 10

From /proc/meminfo
MemTotal:       527795800 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

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

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux"
VERSION="8.3 (Ootpa)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="8.3"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

uname -a:
Linux localhost.localdomain 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 2020
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

(Continued on next page)
Dell Inc. PowerEdge C6520 (Intel Xeon Gold 6330, 2.00 GHz)

SPEC CPU®2017 Floating Point Speed Result

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

SPECspeed®2017_fp_base = 176
SPECspeed®2017_fp_peak = 177

Test Date: Apr-2021
Hardware Availability: Apr-2021
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Platform Notes (Continued)

CVE-2017-5753 (Spectre variant 1): seccomp
Mitigation: usercopy/swapgs barriers and __user pointer sanitation

CVE-2017-5715 (Spectre variant 2): Enhanced IBRS, IBPB:
Mitigation: conditional, RSB filling

CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Apr 23 09:48
SPEC is set to: /mnt/ramdisk/cpu2017-1.1.7-ic2021.1
Filesystem     Type   Size  Used Avail Use% Mounted on
tmpfs          tmpfs  125G   73G   53G  58% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge C6520
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:
   6x 00AD063200AD HMA84GR7CJR4N-XN 32 GB 2 rank 3200, configured at 2933
   10x 00AD063200AD HMAA4GR7AJR8N-XN 32 GB 2 rank 3200, configured at 2933

BIOS:
   BIOS Vendor: Dell Inc.
   BIOS Version: 1.1.2
   BIOS Date: 04/09/2021
   BIOS Revision: 1.1

(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.

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**Compiler Version Notes (Continued)**

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<thead>
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<th>Language</th>
<th>Compilers</th>
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<td>C</td>
<td>644.nab_s(peak)</td>
</tr>
<tr>
<td></td>
<td>Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113</td>
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<tr>
<td>C</td>
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<td>Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000</td>
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Dell Inc.

PowerEdge C6520 (Intel Xeon Gold 6330, 2.00 GHz)

SPECspeed®2017_fp_base = 176
SPECspeed®2017_fp_peak = 177

Compiler Version Notes (Continued)

Fortran, C

621.wrf_s(base, peak) 627.cam4_s(base, peak)
628.pop2_s(base, peak)

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.cactusBSSN_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
Dell Inc.
PowerEdge C6520 (Intel Xeon Gold 6330, 2.00 GHz)

SPECspeed®2017_fp_base = 176
SPECspeed®2017_fp_peak = 177

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

Test Date: Apr-2021
Hardware Availability: Apr-2021
Software Availability: Dec-2020

---

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 -qopenmp -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 -qopenmp -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
- -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
## Dell Inc. PowerEdge C6520 (Intel Xeon Gold 6330, 2.00 GHz)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base = 176</th>
<th>SPECspeed®2017_fp_peak = 177</th>
</tr>
</thead>
</table>

**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Apr-2021  
**Hardware Availability:** Apr-2021  
**Software Availability:** Dec-2020

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

#### C benchmarks:

- 619.lbm_s: basepeak = yes
- 638.imagick_s: basepeak = yes

#### Fortran benchmarks:

- 603.bwaves_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX512 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs -mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
- 649.fotonik3d_s: Same as 603.bwaves_s
- 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

(Continued on next page)
Dell Inc.  
PowerEdge C6520 (Intel Xeon Gold 6330, 2.00 GHz)  

SPECspeed\textsuperscript{\textregistered}2017\_fp\_base = 176  
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Peak Optimization Flags (Continued)  

Benchmarks using Fortran, C, and C++:

607.cactuBSSN\_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

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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{\textregistered}2017 v1.1.7 on 2021-04-28 13:41:45-0400.  
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