## Dell Inc.

**PowerEdge R650 (Intel Xeon Platinum 8352S, 2.20 GHz)**

<table>
<thead>
<tr>
<th>SPECspeed(^{2017_fp_base}) = 207</th>
<th>SPECspeed(^{2017_fp_peak}) = 210</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dell Inc.</td>
<td>Test Date: May-2021</td>
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<tr>
<td>Dell Inc.</td>
<td>Hardware Availability: May-2021</td>
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</tbody>
</table>

### CPU\(^{2017}\) License: 55

- **Test Sponsor:** Dell Inc.
- **Tested by:** Dell Inc.
- **Test Date:** May-2021
- **Software Availability:** Feb-2021

### Hardware

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPEC(^{2017_fp_base})</th>
<th>SPEC(^{2017_fp_peak})</th>
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<tr>
<td>603.bwaves_s</td>
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<td>251</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>251</td>
</tr>
<tr>
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<td>64</td>
<td>138</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>64</td>
<td>203</td>
</tr>
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<td>64</td>
<td>151</td>
</tr>
<tr>
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<td>64</td>
<td>86.2</td>
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<tr>
<td>638.imagick_s</td>
<td>64</td>
<td>196</td>
</tr>
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<td>644.nab_s</td>
<td>64</td>
<td>382</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
<td>433</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
<td>265</td>
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#### SPEC\(^{2017\_fp\_base}\) and SPEC\(^{2017\_fp\_peak}\) Results

<table>
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<td>64</td>
<td>265</td>
<td></td>
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### Software

- **OS:** Red Hat Enterprise Linux 8.3 (Ootpa) 4.18.0-240.15.1.el8_3.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
- **System State:** Run level 5 (graphical multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit

### Power Management

- BIOS and OS set to prefer performance at the cost of additional power usage.

---

**CPU Name:** Intel Xeon Platinum 8352S  
**Max MHz:** 3400  
**Nominal:** 2200  
**Enabled:** 64 cores, 2 chips  
**Orderable:** 1.2 chips  
**Cache L1:** 32 KB I + 48 KB D on chip per core  
**L2:** 1.25 MB I+D on chip per core  
**L3:** 48 MB I+D on chip per chip  
**Other:** None  
**Memory:** 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R)  
**Storage:** 225 GB on tmpfs  
**Other:** None

**File System:** tmpfs  
**System State:** Run level 5 (graphical multi-user)  
**Base Pointers:** 64-bit  
**Peak Pointers:** 64-bit  
**Other:** None  
**jemalloc memory allocator V5.0.1**
Dell Inc.
PowerEdge R650 (Intel Xeon Platinum 8352S, 2.20 GHz)

SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Dell Inc.

GHz)

SPECspeed®2017_fp_peak = 210

SPECspeed®2017_fp_base = 207

Test Date: May-2021
Hardware Availability: May-2021
Software Availability: Feb-2021

Results Table

<table>
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<tr>
<th>Benchmark</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>73.4</td>
<td>197</td>
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<td>649.fotonik3d_s</td>
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<td>256</td>
<td>58.0</td>
<td>271</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 207
SPECspeed®2017_fp_peak = 210

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/cpu2017-1.1.5-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.5-ic2021.1/je5.0.1-64"
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
Fisystem 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 R650 (Intel Xeon Platinum 8352S, 2.20 GHz)

SPECspeed®2017_fp_base = 207
SPECspeed®2017_fp_peak = 210

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

Test Date: May-2021
Hardware Availability: May-2021
Software Availability: Feb-2021

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 225 GB ramdisk created with the cmd: "mount -t tmpfs -o size=225G tmpfs /mnt/ramdisk"

Platform Notes

BIOS Settings:
Logical Processor : Disabled
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/cpu2017-1.1.5-ic2021.1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080a9ea89d4b38e2f1c
running on localhost.localdomain Fri May 7 08:46:07 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) Platinum 8352S CPU @ 2.20GHz
  2 "physical id"s (chips)
  64 "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 : 32
siblings : 32
physical 0: cores 0 1 2 3 4 5 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
physical 1: cores 0 1 2 3 4 5 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

From lscpu:
Architecture: x86_64

(Continued on next page)
Dell Inc.
PowerEdge R650 (Intel Xeon Platinum 8352S, 2.20 GHz)

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

Platform Notes (Continued)

CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 1
Core(s) per socket: 32
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Platinum 8352S CPU @ 2.20GHz
Stepping: 6
CPU MHz: 1136.991
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 49152K
NUMA node0 CPU(s): 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
NUMA node1 CPU(s): 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
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 pdelgb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt pcpd tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 invpcid_single intel_pinn ssbd mba ibrs ibpb stibp ibrs_enhanced fsasbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invvpid cmtd rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt xsaves xsave2 xsaves cmcm_llc cmcm_occup_llc cmcm_mb_total cmcm_mb_local split_lock_detect wbnoinvd dtprim ida ptl pin pts avx512vbmi umip pkp ospe avx512_vbmi2 gfi vaes vpcm12 dq avx512_vnni avx512_vbitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d arch_capabilities

From numactl --hardware 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

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

PowerEdge R650 (Intel Xeon Platinum 8352S, 2.20 GHz)

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

**SPECspeed®2017_fp_base = 207**

**SPECspeed®2017_fp_peak = 210**

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**Platform Notes (Continued)**

52 54 56 58 60 62
node 0 size: 243831 MB
node 0 free: 240781 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
node 1 size: 244742 MB
node 1 free: 250971 MB
node distances:
node 0 1
0: 10 20
1: 20 10

From /proc/meminfo
MemTotal: 527808648 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 4.18.0-240.15.1.el8_3.x86_64 #1 SMP Wed Feb 3 03:12:15 EST 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

(Continued on next page)
Dell Inc.
PowerEdge R650 (Intel Xeon Platinum 8352S, 2.20 GHz)

CPU2017 License: 55
Test Sponsor: Dell Inc.
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SPEC CPU®2017 Floating Point Speed Result
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SPECspeed®2017_fp_base = 207
SPECspeed®2017_fp_peak = 210

Platform Notes (Continued)

CVE-2017-5753 (Spectre variant 1):
Mitigation: usercopy/swapgs 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 5 May 7 04:45
SPEC is set to: /mnt/ramdisk/cpu2017-1.1.5-ic2021.1
Filesystem Type  Size  Used Avail Use% Mounted on
tmpfs   tmpfs  225G   13G  213G   6% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge R650
Product Family: PowerEdge
Serial: 1234567

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:
7x 00AD00B300AD HMAA4GR7AJR8N-XN 32 GB 2 rank 3200
9x 00AD063200AD HMAA4GR7AJR8N-XN 32 GB 2 rank 3200
16x Not Specified Not Specified

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 | 619.1bm_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 R650 (Intel Xeon Platinum 8352S, 2.20 GHz)

**SPECspeed®2017_fp_base = 207**
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### Compiler Version Notes (Continued)

```plaintext
==============================================================================
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.
==============================================================================
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.
```

---

```plaintext
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
```

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

**PowerEdge R650 (Intel Xeon Platinum 8352S, 2.20 GHz)**

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**Software Availability:** Feb-2021

### Compiler Version Notes (Continued)

```plaintext
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

```

### 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`
SPEC CPU® 2017 Floating Point Speed Result

Dell Inc.
PowerEdge R650 (Intel Xeon Platinum 8352S, 2.20 GHz)

SPECspeed® 2017_fp_base = 207
SPECspeed® 2017_fp_peak = 210

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 -W1,-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 -W1,-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 -W1,-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
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.
PowerEdge R650 (Intel Xeon Platinum 8352S, 2.20 GHz)

SPECspeed®2017_fp_base = 207
SPECspeed®2017_fp_peak = 210

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

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

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes
**SPEC CPU®2017 Floating Point Speed Result**

**Dell Inc.**

PowerEdge R650 (Intel Xeon Platinum 8352S, 2.20 GHz)

<table>
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<tr>
<th>SPECspeed®2017_fp_peak</th>
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</tbody>
</table>

**CPU2017 License:** 55  
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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 v1.1.5 on 2021-05-07 09:46:07-0400.  
Report generated on 2021-06-08 19:58:46 by CPU2017 PDF formatter v6442.  
Originally published on 2021-06-08.