# SPEC CPU®2017 Floating Point Speed Result

## Dell Inc.

PowerEdge XR12 (Intel Xeon Gold 6338N, 2.20 GHz)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>126</td>
<td>128</td>
</tr>
</tbody>
</table>

**Test Sponsor:** Dell Inc.

**Hardware Availability:** Jul-2021

**Software Availability:** Feb-2021

**CPU2017 License:** 55

**Test Date:** Apr-2021

**CPU Name:** Intel Xeon Gold 6338N

**Max MHz:** 3500

**Nominal:** 2200

**Enabled:** 32 cores, 1 chip

**Orderable:** 1 chip

**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 (8 x 64 GB 2Rx4 PC4-3200AA-R, running at 2666)

**Storage:** 225 GB on tmpfs

**Other:** None

**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 0.6.2 released Apr-2021

**File System:** tmpfs

**System State:** Run level 5 (graphical 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.

---

<table>
<thead>
<tr>
<th>Test</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>Threads</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>32</td>
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<tr>
<td>SPECspeed®2017_fp_base (126)</td>
<td>335</td>
<td>15.0</td>
<td>30.0</td>
<td>45.0</td>
<td>60.0</td>
<td>75.0</td>
<td>90.0</td>
<td>105</td>
<td>120</td>
<td>135</td>
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<tr>
<td>SPECspeed®2017_fp_peak (128)</td>
<td>330</td>
<td>15.0</td>
<td>30.0</td>
<td>45.0</td>
<td>60.0</td>
<td>75.0</td>
<td>90.0</td>
<td>105</td>
<td>120</td>
<td>135</td>
</tr>
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---

**PowerEdge XR12 (Intel Xeon Gold 6338N, 2.20 GHz)**

**SPECspeed®2017_fp_peak = 128**

**SPECspeed®2017_fp_base = 126**
### 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>
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<th>Seconds</th>
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<tr>
<td>603.bwaves_s</td>
<td>32</td>
<td>179</td>
<td>330</td>
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<td>330</td>
<td>178</td>
<td>331</td>
<td>32</td>
<td>178</td>
<td>331</td>
<td>179</td>
<td>330</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
<td>98.3</td>
<td>170</td>
<td>98.4</td>
<td>169</td>
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<td>169</td>
<td>32</td>
<td>98.3</td>
<td>170</td>
<td>98.4</td>
<td>169</td>
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<tr>
<td>619.ibm_s</td>
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<td>75.1</td>
<td>69.7</td>
<td>75.2</td>
<td>69.6</td>
<td>75.1</td>
<td>69.7</td>
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<td>75.1</td>
<td>69.7</td>
<td>75.2</td>
<td>69.6</td>
</tr>
<tr>
<td>621.wrf_s</td>
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<td>87.0</td>
<td>152</td>
<td>87.8</td>
<td>151</td>
<td>86.9</td>
<td>152</td>
<td>32</td>
<td>81.5</td>
<td>162</td>
<td>80.1</td>
<td>165</td>
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<tr>
<td>627.cam4_s</td>
<td>32</td>
<td>97.7</td>
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<td>97.9</td>
<td>90.5</td>
<td>98.2</td>
<td>90.3</td>
<td>32</td>
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<td>90.7</td>
<td>97.9</td>
<td>90.5</td>
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<tr>
<td>628.pop2_s</td>
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<td>129</td>
<td>92.1</td>
<td>127</td>
<td>93.6</td>
<td>129</td>
<td>92.1</td>
<td>32</td>
<td>129</td>
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<td>93.6</td>
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<tr>
<td>638.imagick_s</td>
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<td>644.nab_s</td>
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</tr>
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<td>649.fotonik3d_s</td>
<td>32</td>
<td>146</td>
<td>62.4</td>
<td>147</td>
<td>62.1</td>
<td>146</td>
<td>62.4</td>
<td>32</td>
<td>146</td>
<td>62.5</td>
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<td>654.roms_s</td>
<td>32</td>
<td>117</td>
<td>135</td>
<td>116</td>
<td>136</td>
<td>116</td>
<td>135</td>
<td>32</td>
<td>117</td>
<td>135</td>
<td>116</td>
<td>135</td>
</tr>
</tbody>
</table>

### 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

Files system page cache synced and cleared with:

```
sync; echo 3 > /proc/sys/vm/drop_caches
```


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 XR12 (Intel Xeon Gold 6338N, 2.20 GHz)

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

SPECspeed®2017_fp_base = 126
SPECspeed®2017_fp_peak = 128

Test Date: Apr-2021
Hardware Availability: Jul-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 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Thu Apr 22 13:24:41 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 6338N CPU @ 2.20GHz
  1 "physical id"s (chips)
  32 "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

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

(Continued on next page)
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- **CPU2017 License:** 55
- **Test Sponsor:** Dell Inc.
- **Tested by:** Dell Inc.
- **Test Date:** Apr-2021
- **Hardware Availability:** Jul-2021
- **Software Availability:** Feb-2021

## Platform Notes (Continued)

```
CPU(s):              32
On-line CPU(s) list: 0-31
Thread(s) per core:  1
Core(s) per socket:  32
Socket(s):           1
NUMA node(s):        1
Vendor ID:           GenuineIntel
CPU family:          6
Model:               106
Model name:          Intel(R) Xeon(R) Gold 6338N CPU @ 2.20GHz
Stepping:            6
CPU MHz:             3339.522
BogoMIPS:            4400.00
Virtualization:      VT-x
L1d cache:           48K
L1i cache:           32K
L2 cache:            128K
L3 cache:            49152K
NUMA node0 CPU(s):   0-31
```

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 pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
- xtpre pdcm pcid 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 invpncid_single
- intel_ppn ssbd mba ibrs ibpb stibp ibrs_enhanced fsgsbase tsc_adjust bm11 hle avx2
- smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma
- clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsaveopt xsave xsetbv1
- xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local split_lock_detect wboinvd
- dtherm ida arat pln pts avx512vbmi umip pku ospe avx512_vbmi2 gfnl vaes vpclmulqdq
- avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d
- arch_capabilities

```
/cacheinfo cache data
  cache size : 49152 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 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 
node 0 size: 487872 MB 
node 0 free: 492070 MB 
node distances: 
  node 0 
  0: 10
```

(Continued on next page)
Dell Inc. PowerEdge XR12 (Intel Xeon Gold 6338N, 2.20 GHz)

SPECspeed®2017_fp_base = 126
SPECspeed®2017_fp_peak = 128

From /proc/meminfo
    MemTotal:       527815508 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):
Mitigation: Speculative Store Bypass disabled via prctl and seccomp

CVE-2018-3639 (Speculative Store Bypass):
Mitigation: usercopy/swaps barriers and __user pointer sanitization

CVE-2017-5753 (Spectre variant 1):
Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

CVE-2017-5715 (Spectre variant 2):
Not affected

CVE-2020-0543 (Special Register Buffer Data Sampling):
Not affected

CVE-2019-11135 (TSX Asynchronous Abort):
Not affected

run-level 5 Apr 22 09:26

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.5-ic2021.1

(Continued on next page)
Dell Inc.

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CPU2017 License: 55  
Test Date: Apr-2021  
Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Hardware Availability: Jul-2021  
Software Availability: Feb-2021

Platform Notes (Continued)

tmpfs  tmpfs  225G  13G  213G  6% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge XR12
Product Family: PowerEdge
Serial: 0990104

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:
5x 002C0632002C 36ASF8G72PZ-3G2B2 64 GB 2 rank 3200, configured at 2666
3x 00CE063200CE M393A8G40AB2-CWE 64 GB 2 rank 3200, configured at 2666

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 0.6.2
BIOS Date: 04/12/2021
BIOS Revision: 0.6

(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)
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Dell Inc.
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SPECcpu2017 Floating Point Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

CPU2017 License: 55
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Compiler Version Notes (Continued)

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C++, C, Fortran | 607.cactuBSSN_s(base, peak)
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Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
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Fortran         | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
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==============================================================================
Fortran, C      | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
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Compiler Version Notes (Continued)

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.libm_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 -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

(Continued on next page)
Base Optimization Flags (Continued)

Fortran benchmarks (continued):
-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

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

(Continued on next page)
**Peak Optimization Flags (Continued)**

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

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


### SPEC CPU®2017 Floating Point Speed Result

**Dell Inc.**

**PowerEdge XR12** (Intel Xeon Gold 6338N, 2.20 GHz)

<table>
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<th>SPECspeed²017_fp_base</th>
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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Apr-2021  
**Hardware Availability:** Jul-2021  
**Software Availability:** Feb-2021

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.

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