# SPEC CPU®2017 Integer Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL110 Gen10 Plus  
(2.10 GHz, Intel Xeon Gold 6338T)

## SPECspeed®2017_int_base = 11.4

## SPECspeed®2017_int_peak = 11.7

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Jul-2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Jun-2021</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Dec-2020</td>
</tr>
</tbody>
</table>

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>24</td>
<td>6.95</td>
<td>8.66</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>24</td>
<td>10.6</td>
<td>11.0</td>
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<tr>
<td>605.mcf_s</td>
<td>24</td>
<td>11.7</td>
<td>19.8</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>24</td>
<td>13.0</td>
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<tr>
<td>623.xalancbmk_s</td>
<td>24</td>
<td></td>
<td>16.6</td>
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<tr>
<td>625.x264_s</td>
<td>24</td>
<td></td>
<td>17.3</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
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<td>5.80</td>
<td></td>
</tr>
<tr>
<td>641.leela_s</td>
<td>24</td>
<td>4.72</td>
<td></td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>24</td>
<td></td>
<td>18.8</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>24</td>
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<td>20.3</td>
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</tbody>
</table>

### CPU2017 License: 3

<table>
<thead>
<tr>
<th>Tested by:</th>
<th>HPE</th>
</tr>
</thead>
</table>

## Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon Gold 6338T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz:</td>
<td>3400</td>
</tr>
<tr>
<td>Nominal:</td>
<td>2100</td>
</tr>
<tr>
<td>Enabled:</td>
<td>24 cores, 1 chip</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1 chip</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 48 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>1.25 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3:</td>
<td>36 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>512 GB (8 x 64 GB 2Rx4 PC4-3200AA-R)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 480 GB NVMe SSD, RAID 0</td>
</tr>
</tbody>
</table>

## Software

<table>
<thead>
<tr>
<th>OS:</th>
<th>Red Hat Enterprise Linux 8.3 (Ootpa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kernel</td>
<td>4.18.0-240.el8.x86_64</td>
</tr>
<tr>
<td>Compiler:</td>
<td>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</td>
</tr>
<tr>
<td>Parallel:</td>
<td>Yes</td>
</tr>
<tr>
<td>Firmware:</td>
<td>HPE BIOS Version U56 v1.50 05/13/2021 released May-2021</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Other:</td>
<td>jemalloc memory allocator V5.0.1</td>
</tr>
<tr>
<td>Power Management:</td>
<td>BIOS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
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#### Results Table

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<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<th>Seconds</th>
<th>Ratio</th>
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<th>Seconds</th>
<th>Ratio</th>
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<th>Ratio</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>24</td>
<td>256</td>
<td>6.94</td>
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**SPECspeed®2017_int_base = 11.4**  
**SPECspeed®2017_int_peak = 11.7**

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"
- 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`

### Environment Variables Notes

Environment variables set by runcpu before the start of the run:
- `KMP_AFFINITY = "granularity=fine,scatter"
- `LD_LIBRARY_PATH = "/cpu2017/lib/intel64:/cpu2017/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
- 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.
- 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)
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**General Notes (Continued)**


Submitted_by: "Bhatnagar, Prateek" <prateek.bhatnagar@hpe.com>
Submitted: Mon Jul 5 08:08:27 EDT 2021
Submission: cpu2017-20210705-27772.sub

**Platform Notes**

The system ROM used for this result contains Intel microcode version 0xd0002a0 for the Intel Xeon Gold 6338T processor.

BIOS Configuration:
- Workload Profile set to General Peak Frequency Compute
- Intel Hyper-Threading set to Disabled
- Thermal Configuration set to Maximum Cooling
- Memory Patrol Scrubbing set to Disabled
- Advanced Memory Protection set to Advanced ECC
- Last Level Cache (LLC) Prefetch set to Enabled
- Last Level Cache (LLC) Dead Line Allocation set to Disabled
- Enhanced Processor Performance set to Enabled
- Workload Profile set to Custom
  - Energy/Performance Bias set to Balanced Power
  - DCU Stream Prefetcher set to Disabled
  - Adjacent Sector Prefetch set to Disabled
  - Minimum Processor Idle Power Package C-State set to No Package State
  - Numa Group Size Optimization set to Flat

Sysinfo program /cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost.localdomain Thu Jul 1 01:39:13 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 6338T CPU @ 2.10GHz
  - 1 "physical id"s (chips)
  - 24 "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: 24
  - siblings: 24
  - physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

From lscpu from util-linux 2.32.1:
- Architecture: x86_64

(Continued on next page)
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Tested by: HPE

Test Date: Jul-2021
Hardware Availability: Jun-2021
Software Availability: Dec-2020

Platform Notes (Continued)

CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 24
On-line CPU(s) list: 0-23
Thread(s) per core: 1
Core(s) per socket: 24
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 6338T CPU @ 2.10GHz
Stepping: 6
CPU MHz: 3324.104
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 36864K
NUMA node 0 CPU(s): 0-23

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
aperfmon perf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrp pdcm pcd 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 ssbd
mba ibpb stibp ibrs enhanced cmp ept_shadow vpxml flexpriority ept vpid ad
fsagbase tsc_adjust bmi1 hle avx2 smep bmi2 3ms invpcid cqm rdseed adx smap
avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw
avx512vl xsaveopt xsavec xsavec xgetbv1 xsaves cqm_llc cqm_occupy_llc cqm_mmb_total
cqm_mbb_local split_lockdetect wboioid dttherm ida arat pin pts avx512vbmi umip pku
ospke avx512_vBMI2 gfni vaes vplmulqdq avx512_vBMI2 bitalg tme
avx512_vpopcntdq la57 rdrpid md_clear pconfig 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 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
node 0 size: 491165 MB
node 0 free: 514157 MB
node distances:
node 0
0: 10

(Continued on next page)
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<th>Test Date: Jul-2021</th>
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<td>Software Availability: Dec-2020</td>
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</tbody>
</table>

**Platform Notes (Continued)**

<table>
<thead>
<tr>
<th>From /proc/meminfo</th>
</tr>
</thead>
<tbody>
<tr>
<td>MemTotal: 528053716 kB</td>
</tr>
<tr>
<td>HugePages_Total: 0</td>
</tr>
<tr>
<td>Hugepagesize: 2048 kB</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>From /etc/<em>release</em> /etc/<em>version</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>os-release:</td>
</tr>
<tr>
<td>NAME=&quot;Red Hat Enterprise Linux&quot;</td>
</tr>
<tr>
<td>VERSION=&quot;8.3 (Ootpa)&quot;</td>
</tr>
<tr>
<td>ID=&quot;rhel&quot;</td>
</tr>
<tr>
<td>ID_LIKE=&quot;fedora&quot;</td>
</tr>
<tr>
<td>VERSION_ID=&quot;8.3&quot;</td>
</tr>
<tr>
<td>PLATFORM_ID=&quot;platform:el8&quot;</td>
</tr>
<tr>
<td>PRETTY_NAME=&quot;Red Hat Enterprise Linux 8.3 (Ootpa)&quot;</td>
</tr>
<tr>
<td>ANSI_COLOR=&quot;0;31&quot;</td>
</tr>
<tr>
<td>redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)</td>
</tr>
<tr>
<td>system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)</td>
</tr>
<tr>
<td>system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga</td>
</tr>
</tbody>
</table>

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

SPEC is set to: /cpu2017  

<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>
</table>

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</table>

### Platform Notes (Continued)

```
/dev/nvme1n1p4 xfs  442G  139G  303G  32% /
```

From /sys/devices/virtual/dmi/id  
Vendor: HPE  
Product: ProLiant DL110 Gen10 Plus  
Product Family: ProLiant  
Serial: T912PP0032

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:  
8x Micron 36ASF8G72PZ-3G2B2 64 GB 2 rank 3200

BIOS:  
BIOS Vendor: HPE  
BIOS Version: U56  
BIOS Date: 05/13/2021  
BIOS Revision: 1.50  
Firmware Revision: 2.40

(End of data from sysinfo program)

### Compiler Version Notes

```
C   | 600.perlbench_s(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.

```
C   | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, 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   | 600.perlbench_s(peak)
```

(Continued on next page)
Compiler Version Notes (Continued)

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       | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak) |
|         | 625.x264_s(base, peak) 657.xz_s(base, 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++     | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) |
|         | 631.deepsjeng_s(base, peak) 641.leela_s(base, 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.

-----------------------------------------------------------------------------
| Fortran | 648.exchange2_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.

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort
## SPEC CPU®2017 Integer Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL110 Gen10 Plus  
(2.10 GHz, Intel Xeon Gold 6338T)  

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base = 11.4</th>
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<tbody>
<tr>
<td>SPECspeed®2017_int_peak = 11.7</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 3  
**Test Sponsor:** HPE  
**Tested by:** HPE  

### Base Portability Flags

- 600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64  
- 602.gcc_s: -DSPEC_LP64  
- 605.mcf_s: -DSPEC_LP64  
- 620.omnetpp_s: -DSPEC_LP64  
- 623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX  
- 625.x264_s: -DSPEC_LP64  
- 631.deepsjeng_s: -DSPEC_LP64  
- 641.leela_s: -DSPEC_LP64  
- 648.exchange2_s: -DSPEC_LP64  
- 657.xz_s: -DSPEC_LP64  

### Base Optimization Flags

**C benchmarks:**  
-DSPEC_OPENMP -std=c11 -m64 -fiopenmp -Wl,-z,muldefs -xCORE-AVX512  
-03 -ffast-math -flto -mfpmath=sse -funroll-loops  
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc  

**C++ benchmarks:**  
-DSPEC_OPENMP -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math  
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-mbranches-within-32B-boundaries  
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin/  
-lqkmalloc  

**Fortran benchmarks:**  
-m64 -xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4  
-nostandard-realloc-lhs -align array32byte -auto  
-mbranches-within-32B-boundaries  

### Peak Compiler Invocation

**C benchmarks (except as noted below):**  
icx  
600.perlbench_s: icc  

**C++ benchmarks:**  
icpx

(Continued on next page)
### Peak Compiler Invocation (Continued)

Fortran benchmarks:

```
ifort
```

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

C benchmarks:

```
600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) 
-xCORE-AVX512 -ipo -O3 -no-prec-div 
-qopt-mem-layout-trans=4 -fno-strict-overflow 
-mbranches-within-32B-boundaries 
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

```
602.gcc_s: -m64 -std=c11 -Wl,-z,muldefs -fprofile-generate(pass 1) 
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto 
-Ofast(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4 
-mbranches-within-32B-boundaries 
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

```
605.mcf_s: basepeak = yes
```

```
625.x264_s: -DSPEC_OPENMP -fiopenmp -std=c11 -m64 -Wl,-z,muldefs 
-xCORE-AVX512 -flto -O3 -ffast-math 
-qopt-mem-layout-trans=4 -fno-alias 
-mbranches-within-32B-boundaries 
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

```
657.xz_s: basepeak = yes
```

C++ benchmarks:

```
620.omnetpp_s: basepeak = yes
```

```
623.xalancbmk_s: basepeak = yes
```

```
631.deepsjeng_s: basepeak = yes
```
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Test Date: Jul-2021  
Hardware Availability: Jun-2021  
Software Availability: Dec-2020  

Peak Optimization Flags (Continued)  

641.leela_s: basepeak = yes  

Fortran benchmarks:  
648.exchange2_s: basepeak = yes  

The flags files that were used to format this result can be browsed at  
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.0-ICX-revE.html  

You can also download the XML flags sources by saving the following links:  
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.0-ICX-revE.xml  
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml

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Tested with SPEC CPU®2017 v1.1.8 on 2021-07-01 02:39:13-0400.  
Originally published on 2021-07-20.