## CPU2017 Floating Point Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL325 Gen10  
(2.00 GHz, AMD EPYC 7702P)

### Hardware

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base = 130</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>64</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>64</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>64</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>64</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>64</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>64</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name: AMD EPYC 7702P</td>
</tr>
<tr>
<td>Max MHz.: 3350</td>
</tr>
<tr>
<td>Nominal: 2000</td>
</tr>
<tr>
<td>Enabled: 64 cores, 1 chip</td>
</tr>
<tr>
<td>Orderable: 1 chip</td>
</tr>
<tr>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2: 512 KB I+D on chip per core</td>
</tr>
<tr>
<td>L3: 256 MB I+D on chip per chip, 16 MB shared / 4 cores</td>
</tr>
<tr>
<td>Other: None</td>
</tr>
<tr>
<td>Memory: 512 GB (8 x 64 GB 4Rx4 PC4-2933Y-L)</td>
</tr>
<tr>
<td>Storage: 1 x 400 GB SAS SSD, RAID 0</td>
</tr>
<tr>
<td>Other: None</td>
</tr>
<tr>
<td>OS: SUSE Linux Enterprise Server 15 (x86_64) SP1</td>
</tr>
<tr>
<td>Compiler: C/C++: Version 1.3.0 of AOCC</td>
</tr>
<tr>
<td>Fortran: Version 4.8.2 of GCC</td>
</tr>
<tr>
<td>Parallel: Yes</td>
</tr>
<tr>
<td>Firmware: HPE BIOS Version A41 07/11/2019 released Aug-2019</td>
</tr>
<tr>
<td>File System: xfs</td>
</tr>
<tr>
<td>System State: Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers: 64-bit</td>
</tr>
<tr>
<td>Peak Pointers: Not Applicable</td>
</tr>
<tr>
<td>Other: jemalloc: jemalloc memory allocator library V5.1.0;</td>
</tr>
</tbody>
</table>
**SPEC CPU2017 Floating Point Speed Result**

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(Test Sponsor: HPE)
ProLiant DL325 Gen10
(2.00 GHz, AMD EPYC 7702P)

**SPECspeed2017_fp_base = 130**
**SPECspeed2017_fp_peak = Not Run**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
<td>172</td>
<td>343</td>
<td>172</td>
<td>343</td>
<td>173</td>
<td>341</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>73.5</td>
<td>227</td>
<td>73.4</td>
<td>227</td>
<td>73.6</td>
<td>227</td>
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<tr>
<td>619.lbm_s</td>
<td>64</td>
<td>163</td>
<td>32.2</td>
<td>163</td>
<td>32.2</td>
<td>163</td>
<td>32.1</td>
<td></td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>64</td>
<td>90.5</td>
<td>146</td>
<td>90.0</td>
<td>147</td>
<td>90.2</td>
<td>147</td>
<td></td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>64</td>
<td>84.6</td>
<td>105</td>
<td>85.1</td>
<td>104</td>
<td>85.0</td>
<td>104</td>
<td></td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>64</td>
<td>180</td>
<td>66.0</td>
<td>180</td>
<td>66.0</td>
<td>179</td>
<td>66.2</td>
<td></td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>64</td>
<td>68.6</td>
<td>210</td>
<td>68.6</td>
<td>210</td>
<td>68.6</td>
<td>210</td>
<td></td>
</tr>
<tr>
<td>644.nab_s</td>
<td>64</td>
<td>61.9</td>
<td>282</td>
<td>61.9</td>
<td>282</td>
<td>61.9</td>
<td>282</td>
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</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
<td>144</td>
<td>63.5</td>
<td>143</td>
<td>63.5</td>
<td>143</td>
<td>63.6</td>
<td></td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
<td>108</td>
<td>146</td>
<td>108</td>
<td>146</td>
<td>108</td>
<td>146</td>
<td></td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

**Compiler Notes**

The AMD64 AOCC Compiler Suite is available at
http://developer.amd.com/amd-aocc/

The AOCC Fortran Plugin version 1.3.0 was used to leverage AOCC optimizers with gfortran. It is available here:
http://developer.amd.com/amd-aocc/

**Submit Notes**

The config file option 'submit' was used.
'numactl' was used to bind copies to the cores.
See the configuration file for details.

**Operating System Notes**

'ulimit -s unlimited' was used to set environment stack size
'ulimit -l 2097152' was used to set environment locked pages in memory limit

runspec command invoked through numactl i.e.:
numactl --interleave=all runspec <etc>

Set dirty_ratio=8 to limit dirty cache to 8% of memory
Set swappiness=1 to swap only if necessary
Set zone_reclaim_mode=1 to free local node memory and avoid remote memory
sync then drop_caches=3 to reset caches before invoking runcpu

(Continued on next page)
Hewlett Packard Enterprise  
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ProLiant DL325 Gen10  
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SPECspeed2017_fp_base = 130  
SPECspeed2017_fp_peak = Not Run

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

Operating System Notes (Continued)

dirty_ratio, swappiness, zone_reclaim_mode and drop_caches were  
all set using privileged echo (e.g. echo 1 > /proc/sys/vm/swappiness).

Transparent huge pages set to 'always' for this run (OS default)

General Notes

Environment variables set by runcpu before the start of the run:  
LD_LIBRARY_PATH = "/home/cpu2017_A2/amd_speed_accc130_naples_A_lib/64;  
/home/cpu2017/amd_speed_accc130_naples_A_lib/32:"  
OMP_DYNAMIC = "false"  
OMP_PLACES = "cores"  
OMP_PROC_BIND = "close"  
OMP_SCHEDULE = "static"  
OMP_STACKSIZE = "192M"  
OMP_WAIT_POLICY = "active"

Binaries were compiled on a system with 2p AMD EPYC 7601 CPU + 512GB Memory using RHEL 7.6

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: configured and built with GCC v4.8.5 in RHEL v7.2 under default conditions.  
https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2

Platform Notes

BIOS Configuration

Thermal Configuration set to Maximum Cooling  
AMD SMT Option set to Disabled  
Determinism Control set to Manual  
Performance Determinism set to Power Deterministic  
Minimum Processor Idle Power Core C-State set to C6 State  
Memory Patrol Scrubbing set to Disabled  
Workload Profile set to General Peak Frequency Compute  
NUMA memory domains per socket set to Four memory domains per socket  
Sysinfo program /home/cpu2017_A2/bin/sysinfo  
Rev: r5974 of 2018-05-19 9bcd8f2999c33d61f64985e45859ea9  
running on linux-stzp Thu Jul 18 09:56:28 2019

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

(Continued on next page)
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CPU2017 License: 3
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Tested by: HPE

Platform Notes (Continued)

From /proc/cpuinfo

    model name : AMD EPYC 7702P 64-Core Processor
        1 "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 : 64
    siblings : 64
    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 24
    25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
    53 54 55 56 57 58 59 60 61 62 63

From lscpu:

    Architecture: x86_64
    CPU op-mode(s): 32-bit, 64-bit
    Byte Order: Little Endian
    Address sizes: 48 bits physical, 48 bits virtual
    CPU(s): 64
    On-line CPU(s) list: 0-63
    Thread(s) per core: 1
    Core(s) per socket: 64
    Socket(s): 1
    NUMA node(s): 1
    Vendor ID: AuthenticAMD
    CPU family: 23
    Model: 49
    Model name: AMD EPYC 7702P 64-Core Processor
    Stepping: 0
    CPU MHz: 2000.000
    CPU max MHz: 2000.0000
    CPU min MHz: 1500.0000
    BogoMIPS: 3992.47
    Virtualization: AMD-V
    L1d cache: 32K
    L1i cache: 32K
    L2 cache: 512K
    L3 cache: 16384K
    NUMA node0 CPU(s): 0-63
    Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
           pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtsscp lm
           constant_tsc rep_good nopl xtopology nonstop_tsc cpuid extd_apicid aperfmperf pni
           pclmulqdq monitor ssse3 fma cx16 sse4_1 sse4_2 movbe popcnt aes xsave avx f16c
           rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch
           osvw ibs kirit wdt tce topoext perfctr_core perfctr_nb bpxext perfctr_l2 mwaitx cpb
           cat_l3 cdp_l3 hw_pstate ssbd ibrs ibpb stibp vmmcall fsgsbase bmi1 avx2 smp bmi2
           cqm rdt_a rdistadm smp clflushopt clwb sha ni xsaveopt xsavesavexsetbv1 xsavevs

(Continued on next page)
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<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
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<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Jul-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Aug-2019</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Jun-2019</td>
</tr>
</tbody>
</table>

Platform Notes (Continued)

cqm_llc cqm_occu_llc cqm_mbm_total cqm_mbm_local clzero irperf xsaveerptr arat npt
lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter
pfthreshold avic v_vmsave_vmload vgif umip rdpid overflow_recov succor smca

/cache data

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
aavailable: 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 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
57 58 59 60 61 62 63
node 0 size: 515818 MB
node 0 free: 515138 MB
node distances:
node 0
0: 10

From /proc/meminfo

MemTotal: 528198576 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

os-release:
NAME="SLES"
VERSION="15-SP1"
VERSION_ID="15.1"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp1"

uname -a:
Linux linux-stzp 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
CVE-2017-5754 (Meltdown): Not affected
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retpoline, IBPB: conditional,
IBRS_FW, STIBP: disabled, RSB filling
run-level 3 Jul 18 07:03

(Continued on next page)
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Platform Notes (Continued)

SPEC is set to: /home/cpu2017_A2
Filesystem Type Size Used Avail Use% Mounted on
/dev/sdc2 btrfs 445G 42G 403G 10% /home

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.

BIOS HPE A41 07/11/2019
Memory:
8x HPE P03054-091 64 GB 4 rank 2933
8x UNKNOWN NOT AVAILABLE

(End of data from sysinfo program)

Compiler Version Notes

CC 619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)

AOCC.LLVM.1.3.0.B34.2018_10_22 clang version 7.0.0 (CLANG: Jenkins)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/aocc1.3.0/AOCC-1.3.0-Compiler/bin

FC 607.cactuBSSN_s(base)

AOCC.LLVM.1.3.0.B34.2018_10_22 clang version 7.0.0 (CLANG: Jenkins)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/aocc1.3.0/AOCC-1.3.0-Compiler/bin

GNU Fortran (GCC) 4.8.2
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(Continued on next page)
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SPECspeed2017_fp_base = 130
SPECspeed2017_fp_peak = Not Run

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

Compiler Version Notes (Continued)

For more information about these matters, see the file named COPYING

------------------------------------------------------------------------------

FC  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
GNU Fortran (GCC) 4.8.2
Copyright (C) 2013 Free Software Foundation, Inc.
GNU Fortran comes with NO WARRANTY, to the extent permitted by law.
You may redistribute copies of GNU Fortran
under the terms of the GNU General Public License.
For more information about these matters, see the file named COPYING
------------------------------------------------------------------------------

CC  621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)
GNU Fortran (GCC) 4.8.2
Copyright (C) 2013 Free Software Foundation, Inc.
GNU Fortran comes with NO WARRANTY, to the extent permitted by law.
You may redistribute copies of GNU Fortran
under the terms of the GNU General Public License.
For more information about these matters, see the file named COPYING
AOCC.LLVM.1.3.0.B34.2018_10_22 clang version 7.0.0 (CLANG: Jenkins
AOCC_1_3_0_Release-Build#34) (based on LLVM AOCC.LLVM.1.3.0.B34.2018_10_22)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/aoccl3.0/AOCC-1.3.0-Compiler/bin
------------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
clang

Fortran benchmarks:
clang gfortran

Benchmarks using both Fortran and C:
clang gfortran

Benchmarks using Fortran, C, and C++:
clang++ clang gfortran
SPEC CPU2017 Floating Point Speed Result
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Test Sponsor: HPE
Tested by: HPE

Test Date: Jul-2019
Hardware Availability: Aug-2019
Software Availability: Jun-2019

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_CASE_FLAG -fconvert=big-endian -DSPEC_LP64
627.cam4_s: -DSPEC_CASE_FLAG -DSPEC_LP64
628.pop2_s: -DSPEC_CASE_FLAG -fconvert=big-endian -DSPEC_LP64
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:
-fflto -Wl,-plugin-opt=-merge-constant
-fflto -Wl,-plugin-opt=-lsr-in-nested-loop
-fflto -Wl,-plugin-opt=-enable-vectorize-compares=false -O3 -ffast-math
-flmarch=znver1 -mno-avx2 -fstruct-layout=3 -mlllvm -unroll-threshold=50
-flmllvm -inline-threshold=1000
-flmfunction-specialization -mlllvm -enable-gvn-hoist
-mlllvm -function-specialize -z muldefs -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lpthread -ldl -ljemalloc -lamdlibm

Fortran benchmarks:
-fflto -Wl,-plugin-opt=-merge-constant
-fflto -Wl,-plugin-opt=-lsr-in-nested-loop
-fflto -Wl,-plugin-opt=-enable-vectorize-compares=false -O3 -mavx -madx
-funroll-loops -ffast-math -z muldefs -fplugin=dragonegg.so
-fplugin-arg-dragonegg-llvm-option=merge-constant
-fplugin-arg-dragonegg-llvm-option=enable-vectorize-compares=false
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lpthread -ldl
-ljemalloc -lamdlibm -lgfortran

Benchmarks using both Fortran and C:
-fflto -Wl,-plugin-opt=-merge-constant
-fflto -Wl,-plugin-opt=-lsr-in-nested-loop
-fflto -Wl,-plugin-opt=-enable-vectorize-compares=false -O3 -ffast-math
-flmarch=znver1 -mno-avx2 -fstruct-layout=3 -mlllvm -unroll-threshold=50
-flmllvm -inline-threshold=1000
-flmfunction-specialization -mlllvm -enable-gvn-hoist
-mlllvm -function-specialize -mavx -madx -funroll-loops -z muldefs
-fplugin=dragonegg.so -fplugin-arg-dragonegg-llvm-option=merge-constant
-fplugin-arg-dragonegg-llvm-option=enable-vectorize-compares=false
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lpthread -ldl

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

Benchmarks using both Fortran and C (continued):

- ljemalloc -lamdlibm -lgfortran

Benchmarks using Fortran, C, and C++:

- std=c++98 -flto -W1, -plugin-opt=-merge-constant
- W1, -plugin-opt=-lsr-in-nested-loop
- W1, -plugin-opt=-enable-vectorize-compares=false -O3 -ffast-math
- march=znver1 -mno-avx2 -fstruct-layout=3 -mlvm -unroll-threshold=50
- fremap-arrays -mlvm -inline-threshold=1000
- -flv-function-specialization -mlvm -enable-gvn-hoist
- -mlvm -function-specialize -mlvm -unroll-threshold=100
- -finline-aggressive -mlvm -enable-vectorize-compares=false -mavx
- -madx -funroll-loops -z muldefs -fplugin=dragonegg.so
- -fplugin-arg-dragonegg-llvm-option=-merge-constant
- -fplugin-arg-dragonegg-llvm-option=-enable-vectorize-compares=false
- -DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lpthread -ldl
- -ljemalloc -lamdlibm

### Base Other Flags

C benchmarks:

- W-no-return-type -DUSE_OPENMP

Fortran benchmarks:

- DUSE_OPENMP -W-no-return-type

Benchmarks using both Fortran and C:

- DUSE_OPENMP -W-no-return-type

Benchmarks using Fortran, C, and C++:

- W-no-return-type -DUSE_OPENMP

---

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/HPE-Platform-Flags-AMD-V1.2-EPYC-revE.xml](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revE.xml)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL325 Gen10
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SPECspeed2017_fp_base = 130
SPECspeed2017_fp_peak = Not Run

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

Test Date: Jul-2019
Hardware Availability: Aug-2019
Software Availability: Jun-2019

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU2017 v1.0.5 on 2019-07-18 09:56:28-0400.
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