SPEC® CPU2017 Floating Point Speed Result

Lenovo Global Technology

ThinkSystem SR860
(2.60 GHz, Intel Xeon Gold 6126T)

SPECspeed2017_fp_base = 130
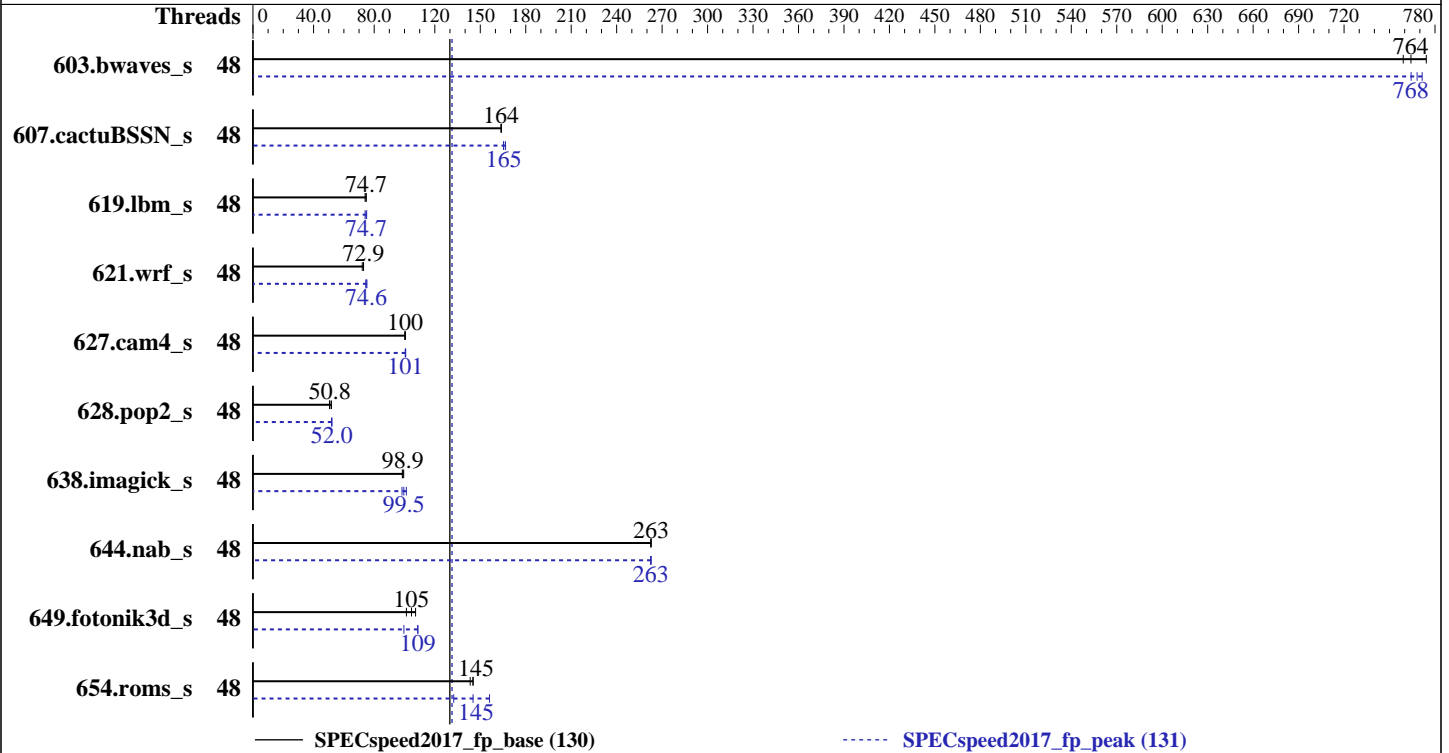
SPECspeed2017_fp_peak = 131

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Jul-2018
Hardware Availability: Nov-2017
Software Availability: May-2018

Threads	Benchmark	base	peak
48	603.bwaves_s	764	768
48	607.cactuBSSN_s	164	165
48	619.lbm_s	74.7	74.7
48	621.wrf_s	72.9	74.6
48	627.cam4_s	100	101
48	628.pop2_s	50.8	52.0
48	638.imagick_s	98.9	99.5
48	644.nab_s	263	263
48	649.fotonik3d_s	105	109
48	654.roms_s	145	145

SPECspeed2017_fp_base (130) — SPECspeed2017_fp_peak (131)

Hardware

CPU Name: Intel Xeon Gold 6126T
 Max MHz.: 3700
 Nominal: 2600
Enabled: 48 cores, 4 chips
Orderable: 2,4 chips
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 19.25 MB I+D on chip per chip
 Other: None
Memory: 768 GB (48 x 16 GB 2Rx8 PC4-2666V-R)
Storage: 1 x 800 GB SAS SSD
Other: None

Software

OS: Red Hat Enterprise Linux Server release 7.4 (Maipo)
 Kernel 3.10.0-693.25.7.el7.x86_64
Compiler: C/C++: Version 18.0.0.128 of Intel C/C++ Compiler for Linux;
 Fortran: Version 18.0.0.128 of Intel Fortran Compiler for Linux
Parallel: Yes
Firmware: Lenovo BIOS Version TEE123N 1.40 released Jun-2018
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None

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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	48	76.2	774	77.7	759	**77.2**	**764**	48	77.2	764	**76.8**	**768**	76.5	772
607.cactuBSSN_s	48	102	164	102	164	**102**	**164**	48	**101**	**165**	101	165	100	167
619.lbm_s	48	**70.1**	**74.7**	70.8	74.0	70.1	74.7	48	**70.1**	**74.7**	70.8	74.0	69.8	75.0
621.wrf_s	48	**181**	**72.9**	183	72.1	181	73.0	48	177	74.6	176	75.2	**177**	**74.6**
627.cam4_s	48	88.1	101	88.5	100	**88.3**	**100**	48	87.9	101	88.2	100	**88.1**	**101**
628.pop2_s	48	235	50.5	229	51.8	**234**	**50.8**	48	228	52.0	**228**	**52.0**	229	51.9
638.imagick_s	48	**146**	**98.9**	145	99.5	146	98.6	48	143	101	147	98.3	**145**	**99.5**
644.nab_s	48	66.6	262	66.5	263	**66.5**	**263**	48	**66.5**	**263**	66.6	262	66.5	263
649.fotonik3d_s	48	84.9	107	90.0	101	**87.1**	**105**	48	83.8	109	**83.8**	**109**	91.5	99.6
654.roms_s	48	**109**	**145**	110	143	108	145	48	101	156	119	132	**108**	**145**
SPECspeed2017_fp_base =		**130**												
SPECspeed2017_fp_peak =		**131**												

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"

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017.1.0.2.ic18.0/lib/ia32:/home/cpu2017.1.0.2.ic18.0/lib/intel64"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017.1.0.2.ic18.0/je5.0.1-32:/home/cpu2017.1.0.2.ic18.0/je5.0.1-64"
OMP_STACKSIZE = "192M"

 Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
 memory using Redhat Enterprise Linux 7.4
 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
Yes: 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.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Custom Mode
CPU P-state Control set to None

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Platform Notes (Continued)

```
Page Policy set to Adaptive
C-States set to Legacy
Energy Efficient Turbo set to Disable
Platform Controlled Type set to Maximum Performance
Hyper-Threading set to Disable
Adjacent Cache Prefetch set to Disable
Stale A to S set to Enable
LLC dead line alloc set to Disable
 Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo
 Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
 running on SR860 Mon Jul 23 15:11:53 2018

 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 6126T CPU @ 2.60GHz
       4  "physical id"s (chips)
       48 "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 : 12
       siblings  : 12
       physical 0: cores 0 1 3 4 5 6 8 9 10 11 12 13
       physical 1: cores 0 2 3 4 5 8 9 10 11 12 13 14
       physical 2: cores 0 2 3 4 5 6 8 9 10 11 12 14
       physical 3: cores 1 2 3 4 5 6 8 9 10 11 12 13

 From lscpu:
       Architecture:          x86_64
       CPU op-mode(s):        32-bit, 64-bit
       Byte Order:            Little Endian
       CPU(s):                48
       On-line CPU(s) list:   0-47
       Thread(s) per core:    1
       Core(s) per socket:    12
       Socket(s):             4
       NUMA node(s):          4
       Vendor ID:             GenuineIntel
       CPU family:            6
       Model:                 85
       Model name:            Intel(R) Xeon(R) Gold 6126T CPU @ 2.60GHz
       Stepping:              4
       CPU MHz:               2601.000
       CPU max MHz:           2601.0000
       CPU min MHz:           1000.0000
```

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Platform Notes (Continued)

```
        BogoMIPS:            5200.00
        Virtualization:      VT-x
        L1d cache:           32K
        L1i cache:           32K
        L2 cache:            1024K
        L3 cache:            19712K
        NUMA node0 CPU(s):   0-11
        NUMA node1 CPU(s):   12-23
        NUMA node2 CPU(s):   24-35
        NUMA node3 CPU(s):   36-47
        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
    aperfmperf eagerfpu pni pclmulqdq dtes64 ds_cpl vmx smx est tm2 ssse3 fma cx16 xtpr
    pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx
    f16c rdrand lahf_lm abm 3dnowprefetch epb cat_l3 cdp_l3 invpcid_single intel_pt
    tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
    erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb
    avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc
    cqm_mbm_total cqm_mbm_local ibpb ibrs stibp dtherm ida arat pln pts spec_ctrl
    intel_stibp ssbd

 /proc/cpuinfo cache data
    cache size : 19712 KB

 From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
 physical chip.
   available: 4 nodes (0-3)
   node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11
   node 0 size: 196286 MB
   node 0 free: 191768 MB
   node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23
   node 1 size: 196608 MB
   node 1 free: 192107 MB
   node 2 cpus: 24 25 26 27 28 29 30 31 32 33 34 35
   node 2 size: 196608 MB
   node 2 free: 192167 MB
   node 3 cpus: 36 37 38 39 40 41 42 43 44 45 46 47
   node 3 size: 196608 MB
   node 3 free: 192213 MB
   node distances:
   node   0   1   2   3
     0:  10  21  21  31
     1:  21  10  31  21
     2:  21  31  10  21
     3:  31  21  21  10
```

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Platform Notes (Continued)

```
From /proc/meminfo
   MemTotal:        792252936 kB
   HugePages_Total:         0
   Hugepagesize:         2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="Red Hat Enterprise Linux Server"
      VERSION="7.4 (Maipo)"
      ID="rhel"
      ID_LIKE="fedora"
      VARIANT="Server"
      VARIANT_ID="server"
      VERSION_ID="7.4"
      PRETTY_NAME="Red Hat Enterprise Linux Server 7.4 (Maipo)"
   redhat-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
   system-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:7.4:ga:server

uname -a:
   Linux SR860 3.10.0-693.25.7.el7.x86_64 #1 SMP Sat May 19 04:36:04 UTC 2018 x86_64
   x86_64 x86_64 GNU/Linux

run-level 3 Jul 23 15:09

SPEC is set to: /home/cpu2017.1.0.2.ic18.0
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda4       xfs   686G  198G  489G  29% /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 Lenovo -[TEE123N-1.40]- 06/12/2018
   Memory:
    48x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666

(End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
  CC  619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)
------------------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
```

(Continued on next page)

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Compiler Version Notes (Continued)

```
--------------------------------------------------------------------------------

==============================================================================
CC    619.lbm_s(peak)
------------------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 FC   607.cactuBSSN_s(base)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
FC    607.cactuBSSN_s(peak)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 FC   603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
------------------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
FC    603.bwaves_s(peak) 649.fotonik3d_s(peak) 654.roms_s(peak)
------------------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

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

(Continued on next page)

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Compiler Version Notes (Continued)

```
--------------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
--------------------------------------------------------------------------


==========================================================================
CC   621.wrf_s(peak) 628.pop2_s(peak)
--------------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
--------------------------------------------------------------------------
```

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`

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Base Optimization Flags

C benchmarks:
```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
```

Fortran benchmarks:
```
-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -align array32byte
```

Benchmarks using both Fortran and C:
```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte
```

Benchmarks using Fortran, C, and C++:
```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte
```

Base Other Flags

C benchmarks:
```
-m64 -std=c11
```

Fortran benchmarks:
```
-m64
```

Benchmarks using both Fortran and C:
```
-m64 -std=c11
```

Benchmarks using Fortran, C, and C++:
```
-m64 -std=c11
```

Peak Compiler Invocation

C benchmarks:
```
icc
```

Fortran benchmarks:
```
ifort
```

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Peak Compiler Invocation (Continued)

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:

619.lbm_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512
`-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div`
`-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp`
`-DSPEC_OPENMP`

638.imagick_s: `-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`
`-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp`
`-DSPEC_OPENMP`

644.nab_s: `Same as 638.imagick_s`

Fortran benchmarks:
-prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP
`-DSPEC_OPENMP -O2 -xCORE-AVX512 -qopt-prefetch -ipo -O3`
`-ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3 -qopenmp`
`-nostandard-realloc-lhs -align array32byte`

Benchmarks using both Fortran and C:

621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512
`-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div`
`-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp`
`-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte`

627.cam4_s: `-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`
`-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp`
`-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte`

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Peak Optimization Flags (Continued)

628.pop2_s: `Same as 621.wrf_s`

Benchmarks using Fortran, C, and C++:
```
-prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512 -qopt-prefetch
-ipo -O3 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs
-align array32byte
```

Peak Other Flags

C benchmarks:
```
-m64 -std=c11
```

Fortran benchmarks:
```
-m64
```

Benchmarks using both Fortran and C:
```
-m64 -std=c11
```

Benchmarks using Fortran, C, and C++:
```
-m64 -std=c11
```

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.html
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-H.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.xml
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-H.xml

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

Tested with SPEC CPU2017 v1.0.2 on 2018-07-23 03:11:52-0400.
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