



# SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

## Lenovo Global Technology ThinkSystem SR250 V2 (3.20 GHz, Intel Xeon E-2388G)

SPECspeed®2017_fp_base =	40.9
SPECspeed®2017_fp_energy_base =	519
SPECspeed®2017_fp_peak =	Not Run
SPECspeed®2017_fp_energy_peak =	Not Run

CPU2017 License: 9017

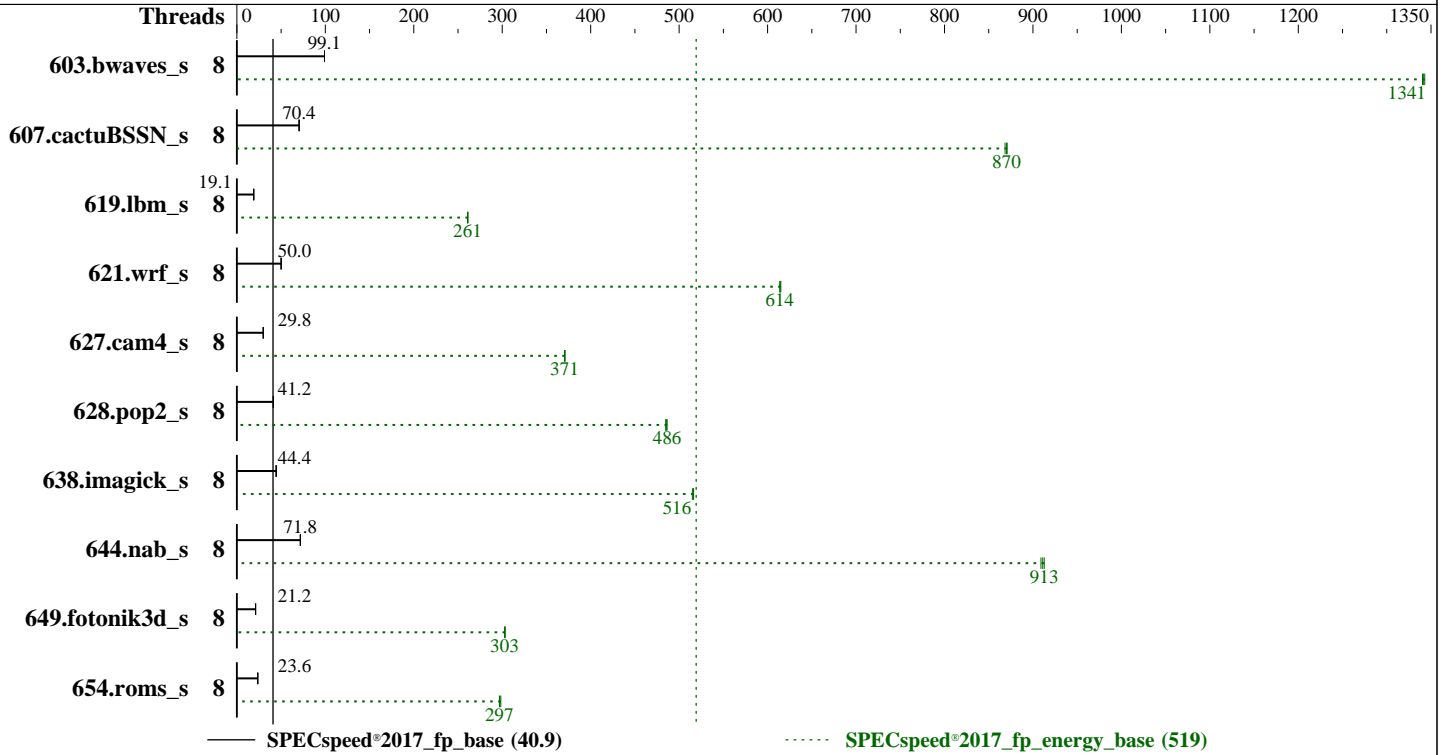
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Feb-2022

Hardware Availability: Apr-2022

Software Availability: May-2021



### Hardware

CPU Name: Intel Xeon E-2388G  
 Max MHz: 5100  
 Nominal: 3200  
 Enabled: 8 cores, 1 chip, 2 threads/core  
 Orderable: 1 chip  
 Cache L1: 32 KB I + 48 KB D on chip per core  
 L2: 512 KB I+D on chip per core  
 L3: 16 MB I+D on chip per chip  
 Other: None  
 Memory: 32 GB (2 x 16 GB 2Rx8 PC4-3200AA-E)  
 Storage: 1 x 960 GB SATA SSD  
 Other: None

### Software

OS: Red Hat Enterprise Linux release 8.4 (Ootpa)  
 Kernel 4.18.0-305.el8.x86\_64  
 Compiler: 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: Lenovo BIOS Version TQE101Q 1.00 released Dec-2021  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: Not Applicable  
 Other: jemalloc memory allocator V5.0.1  
 Power Management: BIOS set to balance power and performance

### Power

Max. Power (W): 101.99  
 Idle Power (W): 37.21  
 Min. Temperature (C): 22.25  
 Elevation (m): 43  
 Line Standard: 220 V / 50 Hz / 1 phase / 3 wires  
 Provisioning: Line-powered



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### Power Settings

Management FW: Version 0.90 of TGBT33E  
Memory Mode: Normal

### Power-Relevant Hardware

Power Supply: 1 x 450 W (non-redundant)  
Details: ThinkSystem 450W Platinum Hot-Swap Power Supply 4P57A12649  
Backplane: 8 x 2.5-inch HDD back plane  
Other Storage: None  
Storage Model #: 4XB7A17089  
NICs Installed: 1 x Broadcom 2-port BCM5720 embedded @ 1 Gb  
NICs Enabled (FW/OS): 2 / 1  
NICs Connected/Speed: 1 @ 1 Gb  
Other HW Model #: 4 x system fans

### Power Analyzer

Power Analyzer: WIN:9888  
Hardware Vendor: YOKOGAWA, Inc.  
Model: YokogawaWT310E  
Serial Number: C3UD17024E  
Input Connection: Default  
Metrology Institute: CNAS  
Calibration By: GRG METROLOGY & TEST (BEIJING) CO., LTD.  
Calibration Label: J202110137471A-0002  
Calibration Date: 21-Oct-2021  
PTDaemon® Version: 1.9.2 (3976349f; 2020-12-08)  
Setup Description: Connected to PSU1  
Current Ranges Used: 1A  
Voltage Range Used: 300V

### Temperature Meter

Temperature Meter: WIN:9889  
Hardware Vendor: Digi International, Inc.  
Model: DigiWATCHPORT\_H  
Serial Number: W62330963  
Input Connection: USB  
PTDaemon Version: 1.9.2 (3976349f; 2020-12-08)  
Setup Description: 50 mm in front of SUT main intake

## Base Results Table

Benchmark	Threads	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power
603.bwaves_s	8	596	99.1	48.0	1340	80.6	83.1	595	99.1	47.9	1340	80.5	83.1	<b>596</b>	<b>99.1</b>	<b>48.0</b>	<b>1340</b>	<b>80.6</b>	<b>83.0</b>
607.cactuBSSN_s	8	237	70.3	21.0	868	88.6	91.7	237	70.5	20.9	871	88.5	91.8	<b>237</b>	<b>70.4</b>	<b>21.0</b>	<b>870</b>	<b>88.5</b>	<b>91.5</b>
619.lbm_s	8	<b>275</b>	<b>19.1</b>	<b>22.8</b>	<b>261</b>	<b>83.1</b>	<b>83.9</b>	275	19.1	22.8	261	82.9	83.5	275	19.1	22.8	261	83.1	83.8
621.wrf_s	8	<b>264</b>	<b>50.0</b>	<b>23.5</b>	<b>614</b>	<b>89.0</b>	<b>90.2</b>	264	50.0	23.5	614	89.0	90.1	264	50.1	23.5	615	88.9	90.1
627.cam4_s	8	297	29.8	26.0	371	87.5	93.4	<b>297</b>	<b>29.8</b>	<b>26.0</b>	<b>371</b>	<b>87.6</b>	<b>93.6</b>	297	29.8	26.0	371	87.5	93.4
628.pop2_s	8	288	41.2	26.9	485	93.3	95.1	288	41.3	26.9	486	93.5	95.2	<b>288</b>	<b>41.2</b>	<b>26.8</b>	<b>486</b>	<b>93.2</b>	<b>95.0</b>
638.imagick_s	8	<b>325</b>	<b>44.4</b>	<b>30.5</b>	<b>516</b>	<b>93.9</b>	<b>102</b>	324	44.6	30.5	516	94.1	102	325	44.3	30.5	515	93.8	102
644.nab_s	8	<b>243</b>	<b>71.8</b>	<b>20.8</b>	<b>913</b>	<b>85.5</b>	<b>88.3</b>	243	71.8	20.9	909	85.9	88.6	243	71.8	20.9	911	85.8	88.2
649.fotonik3d_s	8	431	21.2	33.7	303	78.4	80.8	<b>430</b>	<b>21.2</b>	<b>33.8</b>	<b>303</b>	<b>78.6</b>	<b>80.8</b>	430	21.2	33.8	303	78.6	81.5
654.roms_s	8	666	23.6	59.0	298	88.6	92.2	667	23.6	59.2	297	88.7	92.2	<b>667</b>	<b>23.6</b>	<b>59.3</b>	<b>297</b>	<b>88.9</b>	<b>92.3</b>

SPECspeed®2017\_fp\_base = 40.9

SPECspeed®2017\_fp\_energy\_base = 519

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"



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**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

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**Test Date:** Feb-2022

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## Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
KMP\_AFFINITY = "granularity=fine,compact,1,0"  
LD\_LIBRARY\_PATH =  
    "/home/cpu2017-1.1.8-ic2021.1-revB/lib/intel64:/home/cpu2017-1.1.8-ic2021.1-revB/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  
Filesystem 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.  
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  
sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>

## Platform Notes

BIOS configuration:  
Choose Operating Mode set to Minimal Power  
  
Sysinfo program /home/cpu2017-1.1.8-ic2021.1-revB/bin/sysinfo  
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d  
running on localhost.localdomain Mon Feb 14 10:41:51 2022  
  
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) E-2388G CPU @ 3.20GHz  
1 "physical id"s (chips)

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## Platform Notes (Continued)

16 "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 : 8  
 siblings : 16  
 physical 0: cores 0 1 2 3 4 5 6 7

From lscpu from util-linux 2.32.1:

```

Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:             Little Endian
CPU(s):                 16
On-line CPU(s) list:   0-15
Thread(s) per core:    2
Core(s) per socket:    8
Socket(s):              1
NUMA node(s):          1
Vendor ID:              GenuineIntel
BIOS Vendor ID:        Intel(R) Corporation
CPU family:             6
Model:                  167
Model name:             Intel(R) Xeon(R) E-2388G CPU @ 3.20GHz
BIOS Model name:        Intel(R) Xeon(R) E-2388G CPU @ 3.20GHz
Stepping:               1
CPU MHz:                2395.710
BogoMIPS:               6384.00
Virtualization:         VT-x
L1d cache:              48K
L1i cache:              32K
L2 cache:               512K
L3 cache:               16384K
NUMA node0 CPU(s):     0-15
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
aperfmpperf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
sdbg fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer
aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb invpcid_single
ssbd ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad
fsgsbase tsc_adjust bmi1 avx2 smep bmi2 erms invpcid mpx avx512f avx512dq rdseed adx
smap avx512ifma clflushopt intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt
xsaves xgetbv1 xsaves dtherm arat pln pts avx512vbmi umip pku ospke avx512_vbmi2
gfni vaes vpclmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq rdpid fsrm md_clear
flush_lld arch_capabilities

```

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## Platform Notes (Continued)

```
/proc/cpuinfo cache data
cache size : 16384 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
node 0 size: 32069 MB
node 0 free: 29929 MB
node distances:
node 0
0: 10
```

```
From /proc/meminfo
MemTotal: 32838840 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="8.4 (Ootpa)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="8.4"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.4 (Ootpa)"
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.4:ga
```

```
uname -a:
Linux localhost.localdomain 4.18.0-305.el8.x86_64 #1 SMP Thu Apr 29 08:54:30 EDT 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

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## Platform Notes (Continued)

CVE-2018-3639 (Speculative Store Bypass):	Mitigation: Speculative Store Bypass disabled via prctl and seccomp
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 3 Feb 13 20:32

```
SPEC is set to: /home/cpu2017-1.1.8-ic2021.1-revB
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda4       xfs   790G  103G  688G  13% /home
```

```
From /sys/devices/virtual/dmi/id
Vendor:          Lenovo
Product:         ThinkSystem SR250 V2
Product Family: ThinkSystem
Serial:          1234567890
```

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:
  2x SK Hynix HMA82GU7DJR8N-XN 16 GB 2 rank 3200
```

```
BIOS:
  BIOS Vendor:      Lenovo
  BIOS Version:     TQE101Q-1.00
  BIOS Date:        12/29/2021
  BIOS Revision:    1.0
  Firmware Revision: 0.90
```

(End of data from sysinfo program)

## Compiler Version Notes

```
=====
C          | 619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
-----
```

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## 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++, C, Fortran | 607.cactuBSSN_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.
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.
```

```
=====  
Fortran | 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
```

```
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.
```

```
=====  
Fortran, C | 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)
```

```
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.
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
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```

## Base Compiler Invocation

C benchmarks:  
icc

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## Base Compiler Invocation (Continued)

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
```

## Base Optimization Flags

C benchmarks:

```
-m64 -std=c11 -xCORE-AVX2 -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-AVX2 -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 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
```

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## Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):

```
-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-AVX2 -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
```

The flags files that were used to format this result can be browsed at

[http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64\\_revA.html](http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.html)

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-RocketB-A.html>

You can also download the XML flags sources by saving the following links:

[http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64\\_revA.xml](http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml)

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-RocketB-A.xml>

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