SPEC CPU®2017 Floating Point Speed Result

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Lenovo Global Technology

ThinkSystem SR250 V2
(3.40 GHz, Intel Xeon E-2334)

$SPECspeed®2017\_fp\_base = 34.1$

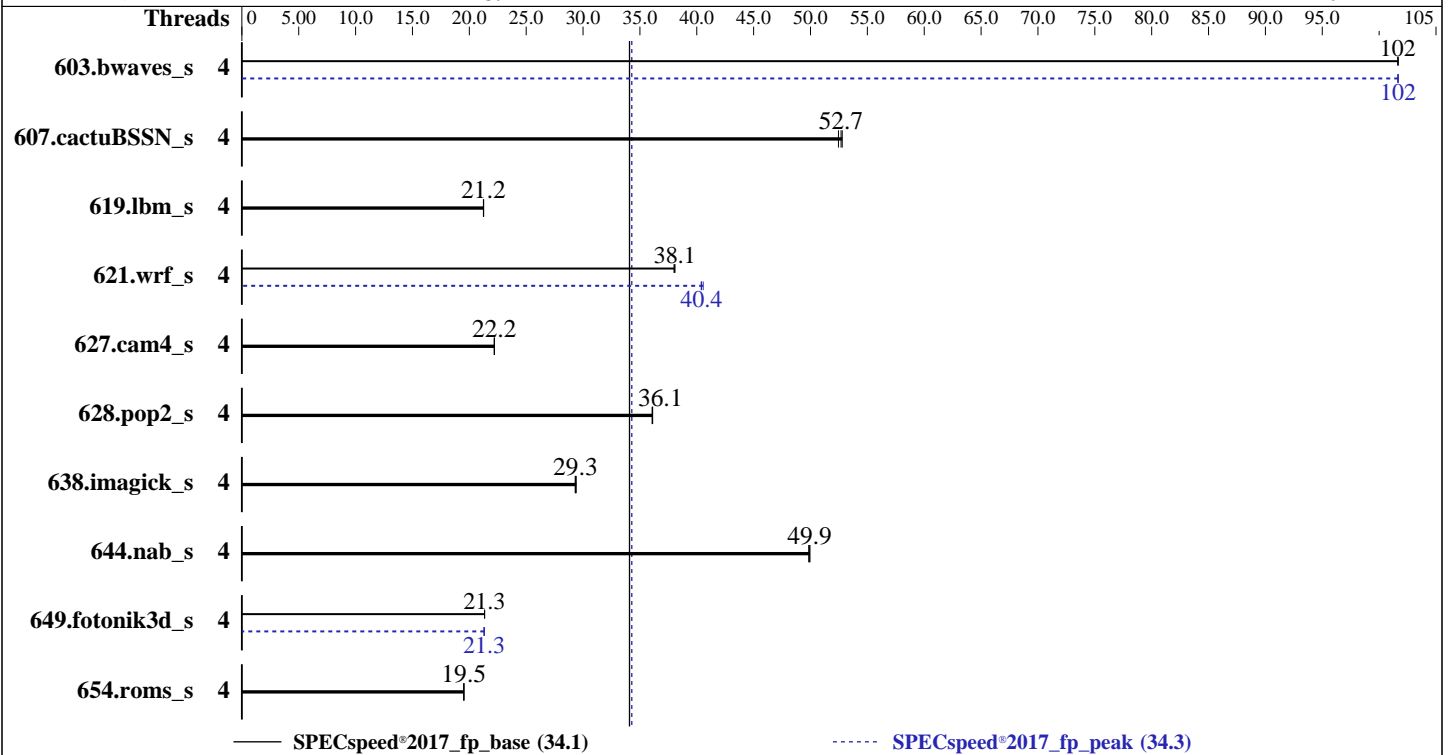$SPECspeed®2017\_fp\_peak = 34.3$

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

Test Date: May-2022
Hardware Availability: Apr-2022
Software Availability: May-2021

Benchmark	Threads	Base	Peak
603.bwaves_s	4	102	102
607.cactuBSSN_s	4	52.7	
619.lbm_s	4	21.2	
621.wrf_s	4	38.1	40.4
627.cam4_s	4	22.2	
628.pop2_s	4	36.1	
638.imagick_s	4	29.3	
644.nab_s	4	49.9	
649.fotonik3d_s	4	21.3	21.3
654.roms_s	4	19.5	

SPECspeed®2017_fp_base (34.1)
SPECspeed®2017_fp_peak (34.3)

Hardware

CPU Name: Intel Xeon E-2334
 Max MHz: 4800
 Nominal: 3400
Enabled: 4 cores, 1 chip
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: 8 MB I+D on chip per chip
 Other: None
Memory: 64 GB (4 x 16 GB 2Rx8 PC4-3200AA-E, running at 2933)
Storage: 1 x 960 GB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux 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 TQE103F 1.01 released Mar-2022
File System: xfs
System State: Run level 3 (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

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SPECspeed®2017_fp_base = 34.1

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SPECspeed®2017_fp_peak = 34.3

Results Table

Benchmark	Base						Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	4	580	102	580	102	**580**	**102**	4	580	102	**580**	**102**	580	102
607.cactuBSSN_s	4	316	52.8	**316**	**52.7**	318	52.5	4	316	52.8	**316**	**52.7**	318	52.5
619.lbm_s	4	**247**	**21.2**	247	21.2	246	21.3	4	**247**	**21.2**	247	21.2	246	21.3
621.wrf_s	4	**347**	**38.1**	347	38.1	348	38.0	4	327	40.4	**327**	**40.4**	326	40.6
627.cam4_s	4	**399**	**22.2**	399	22.2	399	22.2	4	**399**	**22.2**	399	22.2	399	22.2
628.pop2_s	4	329	36.1	329	36.1	**329**	**36.1**	4	329	36.1	329	36.1	**329**	**36.1**
638.imagick_s	4	492	29.3	491	29.4	**492**	**29.3**	4	492	29.3	491	29.4	**492**	**29.3**
644.nab_s	4	351	49.8	350	49.9	**350**	**49.9**	4	351	49.8	350	49.9	**350**	**49.9**
649.fotonik3d_s	4	427	21.3	**427**	**21.3**	427	21.3	4	428	21.3	**428**	**21.3**	428	21.3
654.roms_s	4	**807**	**19.5**	807	19.5	806	19.5	4	**807**	**19.5**	807	19.5	806	19.5
SPECspeed®2017_fp_base =		**34.1**											
SPECspeed®2017_fp_peak =		**34.3**											

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"
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH =
     "/home/cpu2017-1.1.8-ic2021.1-revB/lib/intel64:/home/cpu2017-1.1.8-ic202
     1.1-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 disabled by default
 echo never > /sys/kernel/mm/transparent_hugepage/enabled
 echo never > /sys/kernel/mm/transparent_hugepage/defrag
 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.
```

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$SPECspeed®2017\_fp\_base = 34.1$

$SPECspeed®2017\_fp\_peak = 34.3$

General Notes (Continued)

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 Maximum Performance and then set it to Custom Mode
C-States set to Legacy
Hyper-Threading set to Disabled

 Sysinfo program /home/cpu2017-1.1.8-ic2021.1-revB/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on localhost.localdomain Tue May 10 22:18:54 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-2334 CPU @ 3.40GHz
       1  "physical id"s (chips)
       4 "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 : 4
       siblings  : 4
       physical 0: cores 0 1 2 3

 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):              4
      On-line CPU(s) list: 0-3
      Thread(s) per core:  1
      Core(s) per socket:  4
      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-2334 CPU @ 3.40GHz
```

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Lenovo Global Technology

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CPU2017 License: 9017

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Tested by: Lenovo Global Technology

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Hardware Availability: Apr-2022

Software Availability: May-2021

Platform Notes (Continued)

```
          BIOS Model name:       Intel(R) Xeon(R) E-2334 CPU @ 3.40GHz
          Stepping:              1
          CPU MHz:               4603.099
          BogoMIPS:              6816.00
          Virtualization:        VT-x
          L1d cache:             48K
          L1i cache:             32K
          L2 cache:              512K
          L3 cache:              8192K
          NUMA node0 CPU(s):     0-3
          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
     aperfmperf 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
     xsavec xgetbv1 xsaves dtherm ida arat pln pts avx512vbmi umip pku ospke avx512_vbmi2
     gfni vaes vpclmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq rdpid fsrm md_clear
     flush_l1d arch_capabilities

 /proc/cpuinfo cache data
    cache size : 8192 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
   node 0 size: 64327 MB
   node 0 free: 63643 MB
   node distances:
   node   0
     0:  10

 From /proc/meminfo
    MemTotal:       65871316 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"
```

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Platform Notes (Continued)

```
      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
 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 May 10 22:16

 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
```

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Platform Notes (Continued)

```
 frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.
   Memory:
     4x SK Hynix HMA82GU7DJR8N-XN 16 GB 2 rank 3200, configured at 2933

 BIOS:
    BIOS Vendor:       Lenovo
    BIOS Version:      TQE103F-1.01
    BIOS Date:         03/17/2022
    BIOS Revision:     1.1
    Firmware Revision: 1.95

 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
C                   | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
                    | 644.nab_s(base, 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++, C, Fortran | 607.cactuBSSN_s(base, 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.
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, peak) 649.fotonik3d_s(base, peak)
                 | 654.roms_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.
------------------------------------------------------------------------------
```

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CPU2017 License: 9017		**Test Date:**	May-2022
Test Sponsor:	Lenovo Global Technology	**Hardware Availability:**	Apr-2022
Tested by:	Lenovo Global Technology	**Software Availability:**	May-2021

Compiler Version Notes (Continued)

```
==============================================================================
Fortran, C      | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
                | 628.pop2_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.
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.
------------------------------------------------------------------------------
```

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

Standard Performance Evaluation Corporation (info@spec.org)
https://www.spec.org/

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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
-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
```

Peak 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
```

Peak Portability Flags

```
Same as Base Portability Flags
```

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Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes

638.imagick_s: basepeak = yes

644.nab_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-AVX2
-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-AVX2 -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
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-RocketB-A.html
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-RocketB-A.xml
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml

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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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