Lenovo Global Technology
ThinkSystem SR250
(3.40 GHz, Intel Xeon E-2226G)

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

SPECraten2017_fp_base = 39.8
SPECraten2017_fp_peak = 40.2

Test Date: Jun-2020
Hardware Availability: Mar-2020
Software Availability: Apr-2020

Hardware

CPU Name: Intel Xeon E-2226G
Max MHz: 4700
Nominal: 3400
Enabled: 6 cores, 1 chip
Orderable: 1 chip
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 256 KB I+D on chip per core
L3: 12 MB I+D on chip per chip
Other: None
Memory: 128 GB (4 x 32 GB 2Rx4 PC4-2666V-E)
Storage: 1 x 480 GB SATA SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP1 (x86_64)
Kernel 4.12.14-195-default
Compiler: C/C++: Version 19.1.1.217 of Intel
C/C++ Compiler for Linux;
Fortran: Version 19.1.1.217 of Intel Fortran
Compiler for Linux
Parallel: No
Firmware: Lenovo BIOS Version ISE115D 2.10 released Apr-2020
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 set to prefer performance at the cost of additional power usage
Lenovo Global Technology
ThinkSystem SR250
(3.40 GHz, Intel Xeon E-2226G)

CPU2017 License: 9017
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Tested by: Lenovo Global Technology

Test Date: Jun-2020
Hardware Availability: Mar-2020
Software Availability: Apr-2020

Results Table

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SPECrater2017_fp_base = 39.8
SPECrater2017_fp_peak = 40.2

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

Compiler Notes
The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler.
The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux
The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux

Submit Notes
The taskset mechanism was used to bind copies to processors. The config file option 'submit'
was used to generate taskset commands to bind each copy to a specific processor.
For details, please see the config file.

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:

```
LD_LIBRARY_PATH = "/home/cpu2017-1.1.0-ic19.1.1/lib/intel64:/home/cpu2017-1.1.0-ic19.1.1/j
  e5.0.1-64"
MALLOC_CONF = "retain:true"
```
Lenovo Global Technology
ThinkSystem SR250
(3.40 GHz, Intel Xeon E-2226G)

SPECRate®2017_fp_base = 39.8
SPECRate®2017_fp_peak = 40.2

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
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.
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance

Sysinfo program /home/cpu2017-1.1.0-ic19.1.1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed16e6a485a0011
running on linux-jecn Tue Jun 23 21:51:48 2020

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-2226G CPU @ 3.40GHz
        1 "physical id"s (chips)
        6 "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 : 6
        siblings : 6
        physical 0: cores 0 1 2 3 4 5

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
Address sizes: 39 bits physical, 48 bits virtual
CPU(s): 6
On-line CPU(s) list: 0-5

(Continued on next page)
Lenovo Global Technology

ThinkSystem SR250
(3.40 GHz, Intel Xeon E-2226G)

SPECratre®2017_fp_base = 39.8
SPECratre®2017_fp_peak = 40.2

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Jun-2020
Tested by: Lenovo Global Technology
Hardware Availability: Mar-2020
Software Availability: Apr-2020

Platform Notes (Continued)

Thread(s) per core: 1
Core(s) per socket: 6
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2226G CPU @ 3.40GHz
Stepping: 10
CPU MHz: 3400.000
CPU max MHz: 4700.0000
CPU min MHz: 800.0000
BogoMIPS: 6816.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 12288K
NUMA node0 CPU(s): 0-5
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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperf perf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
sdbg fma cx16 xtpre pdcm pclid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer
aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb invpcid_single
pti ssbd ibrs ibpb stibp tpr_shadow vmi flexpriority ept vpid fsgsbase tsc_adjust
bm1 hle avx2 smep bmi2 erms invpcid rtm mpx rdseed adx smap clflushopt intel_pt
xsavesopt xsavec xgetbvl xsaves dtherm ida arat pln pts hwp hwp_notify hwp_act_window
hwp_epp md_clear flush_l1d

From /proc/cpuinfo cache data
cache size : 12288 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
node 0 size: 128866 MB
node 0 free: 127224 MB
node distances:
node 0
0: 10

From /proc/meminfo
MemTotal: 131958844 KB
HugePages_Total: 0
Hugepagesize: 2048 KB

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR250
(3.40 GHz, Intel Xeon E-2226G)

| SPECrate®2017_fp_base = 39.8 |
| SPECrate®2017_fp_peak = 40.2 |

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
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Test Date: Jun-2020
Hardware Availability: Mar-2020
Software Availability: Apr-2020

Platform Notes (Continued)

```
/usr/bin/lsb_release -d
   SUSE Linux Enterprise Server 15 SP1

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-jecn 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-2018-3620 (L1 Terminal Fault):   Mitigation: PTE Inversion; VMX: conditional
   cache flushes, SMT disabled
Microarchitectural Data Sampling:   Mitigation: Clear CPU buffers; SMT disabled
CVE-2017-5754 (Meltdown):   Mitigation: PTI
CVE-2018-3639 (Speculative Store Bypass):   Mitigation: Speculative Store Bypass disabled
   via prctl and seccomp
CVE-2017-5753 (Spectre variant 1):   Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):   Mitigation: Indirect Branch Restricted
Speculation, IBPB: conditional, IBRS_FW, STIBP: disabled, RSB filling

run-level 3 Jun 23 11:26

SPEC is set to: /home/cpu2017-1.1.0-ic19.1.1
   Filesystem Type Size Used Avail Use% Mounted on
   /dev/sda2   xfs   446G   82G  364G  19% /

From /sys/devices/virtual/dmi/id
   BIOS: Lenovo -[ISE1150-2.10]- 04/24/2020
   Vendor: Lenovo
   Product: ThinkSystem SR250 -[7Y51CT00WW]-
   Product Family: ThinkSystem
   Serial: 1234567890

Additional information from dmidecode follows. WARNING: Use caution when you interpret
   this section. The 'dmidecode' program reads system data which is "intended to allow
Platform Notes (Continued)

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:
4x SK Hynix HMAA4GU7AJR8N-VK 32767 MB 2 rank 2666

(End of data from sysinfo program)

Compiler Version Notes

C               | 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(base, peak)

Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

C++             | 508.namd_r(base, peak) 510.parest_r(base, peak)

Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

C++, C          | 511.povray_r(base) 526.blender_r(base, peak)

Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

C++, C          | 511.povray_r(peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.1217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.1217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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### Lenovo Global Technology

ThinkSystem SR250  
(3.40 GHz, Intel Xeon E-2226G)

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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test Date:** Jun-2020  
**Hardware Availability:** Mar-2020  
**Software Availability:** Apr-2020

### Compiler Version Notes (Continued)

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| Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1  
  NextGen Build 20200304 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |
| Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1  
  NextGen Build 20200304 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |

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  Version 19.1.1.217 Build 20200306 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |
| Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
  Version 19.1.1.217 Build 20200306 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |

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| Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1  
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| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |
| Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1  
  NextGen Build 20200304 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |
| Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
  64, Version 19.1.1.217 Build 20200306 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |

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  64, Version 19.1.1.217 Build 20200306 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |

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Lenovo Global Technology
ThinkSystem SR250
(3.40 GHz, Intel Xeon E-2226G)

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

Test Date: Jun-2020
Hardware Availability: Mar-2020
Software Availability: Apr-2020

Compiler Version Notes (Continued)

Fortran, C | 521.wrf_r(base) 527.cam4_r(base, peak)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306
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==============================================================================
Fortran, C | 521.wrf_r(peak)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306
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==============================================================================
Fortran, C | 521.wrf_r(base) 527.cam4_r(base, peak)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1 NextGen Build 20200304
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==============================================================================
Fortran, C | 521.wrf_r(peak)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306
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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306
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## Lenovo Global Technology

**ThinkSystem SR250**  
(3.40 GHz, Intel Xeon E-2226G)

### SPEC CPU®2017 Floating Point Rate Result

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<th>Test Date:</th>
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**SPECrate®2017_fp_base = 39.8**  
**SPECrate®2017_fp_peak = 40.2**

### Base Compiler Invocation

- **C benchmarks:**  
  icc

- **C++ benchmarks:**  
  icpc

- **Fortran benchmarks:**  
  ifort

- **Benchmarks using both Fortran and C:**  
  ifort icc

- **Benchmarks using both C and C++:**  
  icpc icc

- **Benchmarks using Fortran, C, and C++:**  
  icpc icc ifort

### Base Portability Flags

- 503.bwaves_r: -DSPEC_LP64
- 507.cactuBSSN_r: -DSPEC_LP64
- 508.namd_r: -DSPEC_LP64
- 510.parest_r: -DSPEC_LP64
- 511.povray_r: -DSPEC_LP64
- 519.lbm_r: -DSPEC_LP64
- 521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
- 526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
- 527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
- 538.imagick_r: -DSPEC_LP64
- 544.nab_r: -DSPEC_LP64
- 549.fotonik3d_r: -DSPEC_LP64
- 554.roms_r: -DSPEC_LP64

### Base Optimization Flags

- **C benchmarks:**  
  -m64 -gnextgen -std=c11  
  -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs  
  -fuse-ld=gold -xCORE-AVX2 -Ofast -ffast-math -flto -mfpmath=sse  
  -funroll-loops -gopt-mem-layout-trans=4  
  -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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

**C++ benchmarks:**

```
-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -fuse-ld=gold -xCORE-AVX2 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

**Fortran benchmarks:**

```
-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX2 -O3 -ipo -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-auto -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

**Benchmarks using both Fortran and C:**

```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX2 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

**Benchmarks using both C and C++:**

```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX2 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

**Benchmarks using Fortran, C, and C++:**

```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX2 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```
Lenovo Global Technology
ThinkSystem SR250
(3.40 GHz, Intel Xeon E-2226G)  

Peak Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using both C and C++:
icpc icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
519.lbm_r: basepeak = yes
538.imagick_r: basepeak = yes
544.nab_r: basepeak = yes

C++ benchmarks:
508.namd_r: basepeak = yes
510.parest_r: -m64 -qnextgen
-W1,-plugin-opt=-x86-branches-within-32B-boundaries
-W1,-z,muldefs -fuse-ld=gold -xCORE-AVX2 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -L/usr/local/jemalloc64-5.0.1/lib
-ljemalloc

(Continued on next page)

SPEC CPU®2017 Floating Point Rate Result

SPECrate®2017_fp_base = 39.8
SPECrate®2017_fp_peak = 40.2

Lenovo Global Technology
ThinkSystem SR250
(3.40 GHz, Intel Xeon E-2226G)  

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

CPU2017 License: 9017
Test Date: Jun-2020
Hardware Availability: Mar-2020
Software Availability: Apr-2020

C benchmarks:
icc

C++ benchmarks:
icpc

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ifort

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(Continued on next page)
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CPU2017 License: 9017
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SPECCPU2017_fp_base = 39.8
SPECCPU2017_fp_peak = 40.2

Test Date: Jun-2020
Hardware Availability: Mar-2020
Software Availability: Apr-2020

Peak Optimization Flags (Continued)

Fortran benchmarks:

503.bwaves_r: -m64 -W1, -plugin-opt=-x86-branches-within-32B-boundaries
-W1,-z,muldefs -fuse-ld=gold -xCORE-AVX2 -O3 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-align array32byte -auto -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

549.fotonik3d_r: basepeak = yes
554.roms_r: Same as 503.bwaves_r

Benchmarks using both Fortran and C:

521.wrf_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2 -O3 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

511.povray_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2 -O3 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: 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-SKL-J.html
## Lenovo Global Technology

**ThinkSystem SR250**  
*(3.40 GHz, Intel Xeon E-2226G)*

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<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
<th>39.8</th>
</tr>
</thead>
<tbody>
<tr>
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<td>40.2</td>
</tr>
</tbody>
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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test Date:** Jun-2020  
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**Software Availability:** Apr-2020

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-SKL-J.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-J.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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