## Lenovo Global Technology

**ThinkSystem SR250 V2**  
(2.80 GHz, Intel Xeon E-2378G)

<table>
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<tr>
<th>Copies</th>
<th>SPECrate®2017_fp_base = 57.5</th>
<th>SPECrate®2017_fp_peak = 58.1</th>
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<tbody>
<tr>
<td>503.bwaves_r</td>
<td>8</td>
<td>94.0</td>
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<tr>
<td>507.cactuBSSN_r</td>
<td>8</td>
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<td>508.namd_r</td>
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<td>8</td>
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<td>554.roms_r</td>
<td>8</td>
<td>21.7</td>
</tr>
</tbody>
</table>

---

**Hardware**

- **CPU Name:** Intel Xeon E-2378G  
- **Max MHz:** 5100  
- **Nominal:** 2800  
- **Enabled:** 8 cores, 1 chip  
- **Orderable:** 1 chip  
- **Cache L1:** 32 KB I + 48 KB D on chip per core  
- **Cache L2:** 512 KB I+D on chip per core  
- **Cache L3:** 16 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:** SUSE Linux Enterprise Server 15 SP3 (x86_64)  
- **Compiler:** C/C++: Version 2021.1 of Intel oneAPI DPC++/C++ Compiler Build 20201113 for Linux;  
  Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux;  
- **Parallel:** No  
- **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
Lenovo Global Technology

ThinkSystem SR250 V2
(2.80 GHz, Intel Xeon E-2378G)

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology

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

SPECrate®2017_fp_base = 57.5
SPECrate®2017_fp_peak = 58.1

Results Table

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<td>589</td>
<td>21.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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 = 
MALLOCONF = "retain:true"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7940X CPU + 64GB RAM
memory using openSUSE Leap 15.2
Transparent Huge Pages disabled by default
echo never > /sys/kernel/mm/transparent_hugepage/enabled

(Continued on next page)
# Lenovo CPU2017 Floating Point Rate Result

## Lenovo Global Technology
ThinkSystem SR250 V2
(2.80 GHz, Intel Xeon E-2378G)

<table>
<thead>
<tr>
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<th>SPECrate®2017_fp_peak</th>
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<td>57.5</td>
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</table>

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

## General Notes (Continued)

- 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.  
**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 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-revA-update1/bin/sysinfo  
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf64d  
running on localhost Tue May 17 08:19:43 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-2378G CPU @ 2.80GHz  
  1 "physical id"s (chips)  
  8 "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 : 8  
  physical 0: cores 0 1 2 3 4 5 6 7

From lscpu from util-linux 2.36.2:  
- 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): 8  
- On-line CPU(s) list: 0-7

(Continued on next page)
Lenovo Global Technology
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SPECrate®2017_fp_base = 57.5
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Thread(s) per core: 1
Core(s) per socket: 8
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 167
Model name: Intel(R) Xeon(R) E-2378G CPU @ 2.80GHz
Stepping: 1
CPU MHz: 4788.643
BogoMIPS: 5616.00
Virtualization: VT-x
L1d cache: 384 KiB
L1i cache: 256 KiB
L2 cache: 4 MiB
L3 cache: 16 MiB
NUMA node0 CPU(s): 0-7
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitation
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
Vulnerability Srbd: Not affected
Vulnerability Txs async abort: Not affected
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 rdscp 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 ibp 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 ciflushopt intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsaves xgetbv1 xsaves dtherm ida arat pln pts avx512v bmi umip kpu ospke avx512_vbmi2 gfn vaes vpclmulqdq avx512_vnni avx512_bitalg avx512_vpindentq rdpid fism md_clear flush_lld arch_capabilities

From lscpu --cache:
NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d 48K 384K 12 Data 1 64 1 64
L1i 32K 256K 8 Instruction 1 64 1 64
L2 512K 4M 8 Unified 2 1024 1 64

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR250 V2
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SPECrater®2017_fp_base = 57.5
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Platform Notes (Continued)

L3  16M  16M  16 Unified  3 16384  1  64
/proccpuinfo 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
   node 0 size: 64233 MB
   node 0 free: 63082 MB
   node distances:
      node 0
         0: 10

From /proc/meminfo
   MemTotal: 65775136 kB
   HugePages_Total: 0
   Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="SLES"
      VERSION="15-SP3"
      VERSION_ID="15.3"
      PRETTY_NAME="SUSE Linux Enterprise Server 15 SP3"
      ID="sles"
      ID_LIKE="suse"
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:15:sp3"

uname -a:
   Linux localhost 5.3.18-57-default #1 SMP Wed Apr 28 10:54:41 UTC 2021 (ba3c2e9) 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/swaps
   barriers and __user pointer
   sanitization

(Continued on next page)
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Platform Notes (Continued)

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 17 01:43

SPEC is set to: /home/cpu2017-1.1.8-ic2021.1-revA-update1
Filesystem Type Size Used Avail Use% Mounted on
/dev/sdb3 xfs 892G 34G 858G 4% /

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

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               | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
| 544.nab_r(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
==============================================================================

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

(Continued on next page)
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SPECrates:
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Compiler Version Notes (Continued)

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------------------------------------------------------------------------------
C++, C | 511.povray\_r(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.

------------------------------------------------------------------------------
C++, C | 511.povray\_r(base) 526.blender\_r(base, peak)
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C++, C | 511.povray\_r(base) 526.blender\_r(base, peak)
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Hardware Availability: Apr-2022
Software Availability: Jun-2021

Compiler Version Notes (Continued)

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
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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         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
554.roms_r(base, peak)
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112_000000
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
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Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

(Continued on next page)
Base Compiler Invocation (Continued)

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icx

Benchmarks using both C and C++:
icpx icx

Benchmarks using Fortran, C, and C++:
icpx icx 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:
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

C++ benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

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Lenovo Global Technology
ThinkSystem SR250 V2
(2.80 GHz, Intel Xeon E-2378G)

SPEC CPU®2017 Floating Point Rate Result
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Lenovo Global Technology

SPECRate®2017_fp_base = 57.5
SPECRate®2017_fp_peak = 58.1

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

Base Optimization Flags (Continued)

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -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 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both Fortran and C:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -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
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both C and C++:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using Fortran, C, and C++:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Peak Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icx

(Continued on next page)
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| SPECrate®2017_fp_base = 57.5 |
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Peak Compiler Invocation (Continued)

Benchmarks using both C and C++:
511.povray_r: icpc icc
526.blender_r: icpx icx

Benchmarks using Fortran, C, and C++:
icpx icx 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: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto
-Ofast -qopt-mem-layout-trans=4
-fimf-accuracy-bits=14:sqrt
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

C++ benchmarks:
508.namd_r: basepeak = yes
510.parest_r: basepeak = yes

Fortran benchmarks:
503.bwaves_r: basepeak = yes
549.fotonik3d_r: basepeak = yes
554.roms_r: basepeak = yes

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SPECrate®2017_fp_peak = 58.1

Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

521.wrf_r: basepeak = yes
527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

511.povray_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -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

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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