### Lenovo Global Technology

**ThinkSystem SR250**  
(3.40 GHz, Intel Xeon E-2278G)

<table>
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<th>Test Date</th>
<th>Jun-2020</th>
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<tbody>
<tr>
<td>Hardware Availability</td>
<td>Mar-2020</td>
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<td>Apr-2020</td>
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**CPU2017 License**: 9017  
**Test Sponsor**: Lenovo Global Technology  
**Tested by**: Lenovo Global Technology

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
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</thead>
<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>13.5</td>
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**Threads**

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<td>xalancbmk_s</td>
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</tr>
<tr>
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<td>deepsjeng_s</td>
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<td>6.13</td>
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<td>exchange2_s</td>
<td>21.6</td>
</tr>
<tr>
<td>xz_s</td>
<td>17.4</td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name**: Intel Xeon E-2278G  
- **Max MHz**: 5000  
- **Nominal**: 3400  
- **Enabled**: 8 cores, 1 chip, 2 threads/core  
- **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**: 16 MB I+D on chip per chip  
- **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**: Yes  
- **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-2278G)

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

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#### Results Table

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<th>Benchmark</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Base Seconds</th>
<th>Ratio</th>
<th>Peak Seconds</th>
<th>Ratio</th>
<th>Base Seconds</th>
<th>Ratio</th>
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<td>354</td>
<td>17.5</td>
<td>355</td>
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</table>

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### 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

### 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,scatter"
- **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"
- **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:

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR250
(3.40 GHz, Intel Xeon E-2278G)

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

General Notes (Continued)

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.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3640 (Spectre variant 3a) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3639 (Spectre variant 4) 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
Zero Output set to Advanced Mode
Per Core P-state set to Disable

Sysinfo program /home/cpu2017-1.1.0-ic19.1.1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7eddb1e6e46a485a0011
running on linux-jecn Thu Feb 14 22:22:19 2019

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-2278G CPU @ 3.40GHz
 1 "physical id"s (chips)
 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:
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): 16

(Continued on next page)
Lenovo Global Technology

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(3.40 GHz, Intel Xeon E-2278G)

SPEC CPU®2017 Integer Speed Result

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| SPECspeed®2017_int_base = 13.2 |
| SPECspeed®2017_int_peak = 13.5 |

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

Platform Notes (Continued)

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
CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2278G CPU @ 3.40GHz
Stepping: 13
CPU MHz: 3400.000
CPU max MHz: 5000.0000
CPU min MHz: 800.0000
BogoMIPS: 6816.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
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 dts tsc
lp constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aerpmperf tscknown_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
sdmb fma cx16 xtpr 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
ssbd ibrs ibpb stibp ibrs_enhanced tpr_shadow vmlinuz flexpriority ept vpid fsgsbase
tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm mpx rdseed adx smap clflushopt
intel_pt xsaveopt xsavec xgetbv1 xsave xsaves dtherm ida arat pln pts hwp hwp_notif_y
hwp_act_window hwp_epp md_clear flush_lld arch_capabilities

/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: 128864 MB
   node 0 free: 128327 MB
   node distances:
      node 0
      0: 10

From /proc/meminfo
   MemTotal: 131956960 kB
   HugePages_Total: 0

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR250
(3.40 GHz, Intel Xeon E-2278G)

SPECspeed®2017_int_base = 13.2
SPECspeed®2017_int_peak = 13.5

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Hardware Availability: Mar-2020
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Software Availability: Apr-2020

Test Date: Jun-2020

Platform Notes (Continued)

Hugepagesize: 2048 kB

/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): 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: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

run-level 3 Feb 14 22:21

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 -[ISE115D-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 hardware to be accurately determined", but the intent may not be met, as there are

(Continued on next page)
Platform Notes (Continued)

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       | 600.perlbench_s(base) 602gcc_s(base, peak) 605.mcf_s(base, peak)  
       | 625.x264_s(base, peak) 657.xz_s(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       | 600.perlbench_s(peak)  
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.
==============================================================================
C       | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak)  
       | 625.x264_s(base, peak) 657.xz_s(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       | 600.perlbench_s(peak)  
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.
==============================================================================
C++     | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak)  
       | 631.deepsjeng_s(base, peak) 641.leela_s(base, peak)  
(Continued on next page)
Lenovo Global Technology
ThinkSystem SR250
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SPECSPEED®2017_int_base = 13.2
SPECSPEED®2017_int_peak = 13.5

Compiler Version Notes (Continued)

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.

Fortran | 648.exchange2_s(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.

Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Base Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -qnextgen -std=c11
### Base Optimization Flags (Continued)

C benchmarks (continued):
- `-Wl,-plugin-opt=-x86-branches-within-32B-boundaries` `-Wl,-z,muldefs`
- `-xCORE-AVX2` `-O3` `-ffast-math` `-flto` `-mfpmath=sse` `-funroll-loops`
- `-fuse-ld=gold` `-qopt-mem-layout-trans=4` `-fopenmp` `-DSPEC_OPENMP`
- `-L/usr/local/jemalloc64-5.0.1/lib` `-ljemalloc`

C++ benchmarks:
- `-m64` `-qnextgen` `-Wl,-plugin-opt=-x86-branches-within-32B-boundaries`
- `-Wl,-z,muldefs` `-xCORE-AVX2` `-O3` `-ffast-math` `-flto` `-mfpmath=sse`
- `-funroll-loops` `-fuse-ld=gold` `-qopt-mem-layout-trans=4`
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin`
- `-ljkmalloc`

Fortran benchmarks:
- `-m64` `-Wl,-plugin-opt=-x86-branches-within-32B-boundaries` `-xCORE-AVX2`
- `-O3` `-ipo` `-no-prec-div` `-qopt-mem-layout-trans=4`
- `-nostandard-realloc-lhs` `-align array32byte`
- `-mbranches-within-32B-boundaries`

### Peak Compiler Invocation

C benchmarks:
- `icc`

C++ benchmarks:
- `icpc`

Fortran benchmarks:
- `ifort`

### Peak Portability Flags

- `600.perlbench_s: -DSPEC_LP64` `-DSPEC_LINUX_X64`
- `602.gcc_s: -DSPEC_LP64(*)` `-DSPEC_LP64`
- `605.mcf_s: -DSPEC_LP64`
- `620.omnetpp_s: -DSPEC_LP64`
- `623.xalancbmk_s: -DSPEC_LP64` `-DSPEC_LINUX`
- `625.x264_s: -DSPEC_LP64`
- `631.deepsjeng_s: -DSPEC_LP64`
- `641.leela_s: -DSPEC_LP64`
- `648.exchange2_s: -DSPEC_LP64`

(Continued on next page)
Peak Portability Flags (Continued)

(* Indicates a portability flag that was found in a non-portability variable.

Peak Optimization Flags

C benchmarks:

600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-strict-overflow
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

602.gcc_s: -m64 -qnextgen -std=c11 -fuse-ld=gold
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX2 -flto
-O2(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

605.mcf_s: basepeak = yes

625.x264_s: -m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX2 -flto -O3 -ffast-math
-fuse-ld=gold -qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

657.xz_s: basepeak = yes

C++ benchmarks:

620.omnetpp_s: basepeak = yes

623.xalancbmk_s: basepeak = yes

631.deepsjeng_s: basepeak = yes

641.leela_s: basepeak = yes

Fortran benchmarks:

(Continued on next page)
### Lenovo Global Technology

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<td>Apr-2020</td>
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</tbody>
</table>

**Peak Optimization Flags (Continued)**

648.exchange2_s: 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-SKL-J.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-J.xml)

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