SPEC CPU®2017 Integer Speed Result

Lenovo Global Technology
ThinkSystem SR250
(3.60 GHz, Intel Xeon E-2246G)

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>12.2</th>
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<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>12.6</td>
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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

<table>
<thead>
<tr>
<th>Thread</th>
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<td>605.mcf_s</td>
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<tr>
<td>620.omnetpp_s</td>
<td>8.78</td>
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<tr>
<td>623.xalanchmk_s</td>
<td>6</td>
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</tr>
<tr>
<td>625.x264_s</td>
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<td>23.7</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>6</td>
<td>16.8</td>
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<tr>
<td>641.leela_s</td>
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<tr>
<td>648.exchange2_s</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>657.xz_s</td>
<td>6</td>
<td>20.8</td>
</tr>
</tbody>
</table>

**Hardware**
- CPU Name: Intel Xeon E-2246G
- Max MHz: 4800
- Nominal: 3600
- 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)
- Compiler: C/C++; Version 19.1.1.217 of Intel
- 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
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SPECspeed®2017_int_base = 12.2
SPECspeed®2017_int_peak = 12.6

Results Table

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<th>Seconds</th>
<th>Ratio</th>
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</table>

SPECspeed®2017_int_base = 12.2
SPECspeed®2017_int_peak = 12.6

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.

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:
sync; echo 3> /proc/sys/vm/drop_caches
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)

(Continued on next page)
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SPECspeed®2017_int_base = 12.2
SPECspeed®2017_int_peak = 12.6

General Notes (Continued)

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.


Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Hyper-Threading set to Disable
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 295195f888a3d7ed1e6e46a485a0011
running on linux-jecn Thu Feb 14 22:27:20 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-2246G CPU @ 3.60GHz
  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
Thread(s) per core: 1
Core(s) per socket: 6
Socket(s): 1
NUMA node(s): 1

(Continued on next page)
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SPECspeed®2017_int_base = 12.2
SPECspeed®2017_int_peak = 12.6

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)

Vendor ID: GenuineIntel
CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2246G CPU @ 3.60GHz
Stepping: 10
CPU MHz: 3600.000
CPU max MHz: 4800.0000
CPU min MHz: 800.0000
BogoMIPS: 7200.00
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 apic sm mmx ext tm2 ssse3
sdbg fma cx16 xtradv pmcm ptcpid 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 vnmi flexpriority ept vpid fsgsbase tsc_adjust
bmi1 hle avx2 smep bmi2 erms invpcid rtl mpx rdseed adx smap clflushopt intel_pt
xsaveopt xsavec xgetbv1 xsaves dtherm ida arat pln pts hwp hwp_notify hwp_act_window
hwp_epp md_clear flush_l1d

/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: 128373 MB
    node distances:
        node 0
          0: 10

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

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

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SPECspeed®2017_int_base = 12.2
SPECspeed®2017_int_peak = 12.6

Test Date: Jun-2020
Hardware Availability: Mar-2020
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Platform Notes (Continued)

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
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, 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
frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.
Memory:
   4x SK Hynix HMAA4GU7AJR8N-VK 32767 MB 2 rank 2666

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SPECspeed®2017_int_base = 12.2
SPECspeed®2017_int_peak = 12.6

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

Platform Notes (Continued)

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
| 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       | 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) |
==============================================================================

Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
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SPEC CPU®2017 Integer Speed Result

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ThinkSystem SR250
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Test Date: Jun-2020
Hardware Availability: Mar-2020
Software Availability: Apr-2020

SPECspeed®2017_int_base = 12.2
SPECspeed®2017_int_peak = 12.6

Compiler Version Notes (Continued)

------------------------------------------------------------------------------
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
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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 -mnextgen -std=cl1
-Wl, -plugin-opt=-x86-branches-within-32B-boundaries -Wl, -z, muldefs
-xCORE-AVX2 -03 -ffast-math -flto -mfpmath=sse -funroll-loops
-fuse-ld=gold -qopt-mem-layout-trans=4 -fopenmp -DSPEC_OPENMP

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Lenovo Global Technology
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| SPECspeed®2017_int_base = 12.2 |
| SPECspeed®2017_int_peak = 12.6 |

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Base Optimization Flags (Continued)

C benchmarks (continued):
- 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
- -lqkmalloc

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
657.xz_s: -DSPEC_LP64

(*) Indicates a portability flag that was found in a non-portability variable.
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Test Date: Jun-2020
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Software Availability: Apr-2020

Peak Optimization Flags

C benchmarks:

600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass l) -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
-ipo -O3 -ffast-math -fipa-wall -fipa-extra=1
-xCORE-AVX2 -flto
-Ofast(pass l) -O3 -ffast-math -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

605.mcf_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:

648.exchange2_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-SKL-J.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-J.xml
## Lenovo Global Technology

### ThinkSystem SR250
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### SPECspeed®2017 Integer Speed Result

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<tr>
<th>Specification</th>
<th>Value</th>
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<tr>
<td>SPECspeed®2017_int_peak</td>
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### Details:

- **CPU2017 License:** 9017
- **Test Sponsor:** Lenovo Global Technology
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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.1.0 on 2019-02-14 09:27:20-0500.  
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