## Lenovo Global Technology

### SPEC CPU®2017 Integer Speed Result

**Lenovo Global Technology**  
**ThinkSystem ST50**  
*(3.40 GHz, Intel Xeon E-2236)*

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>12.4</th>
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<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
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<table>
<thead>
<tr>
<th>Test Sponsor:</th>
<th>Lenovo Global Technology</th>
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<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>CPU2017 License:</td>
<td>9017</td>
</tr>
<tr>
<td>Test Date:</td>
<td>Jun-2020</td>
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<tr>
<td>Hardware Availability:</td>
<td>Mar-2020</td>
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<td>Software Availability:</td>
<td>Apr-2020</td>
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### Threads

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<td>605.mcf_s</td>
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<td>620.omnetpp_s</td>
<td>12</td>
<td>8.88</td>
<td>23.6</td>
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<td>623.xalancbmk_s</td>
<td>12</td>
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<td>19.9</td>
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<td>625.x264_s</td>
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<td>631.deepsjeng_s</td>
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<tr>
<td>641.leela_s</td>
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<td>648.exchange2_s</td>
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<tr>
<td>657.xz_s</td>
<td>12</td>
<td>5.88</td>
<td>14.2</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon E-2236
- **Max MHz:** 4800
- **Nominal:** 3400
- **Enabled:** 6 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:** 12 MB I+D on chip per chip
- **Other:** None
- **Memory:** 64 GB (4 x 16 GB 2Rx8 PC4-2666V-E)
- **Storage:** 1 x 960 GB SATA SSD
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux 8.1 (Ootpa)
- **Kernel:** 4.18.0-147.el8.x86_64
- **Compiler:** C/C++: Version 19.1.1.217 of Intel C/C++ Compiler for Linux;
  Fortran: Version 19.1.1.217 of Intel Fortran
- **Parallel:** Yes
- **Firmware:** Lenovo BIOS Version ITIE109B 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
SPEC CPU®2017 Integer Speed Result

Lenovo Global Technology
ThinkSystem ST50
(3.40 GHz, Intel Xeon E-2236)

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

SPECspeed®2017_int_base = 12.4
SPECspeed®2017_int_peak = 12.7

Results Table

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</tr>
</tbody>
</table>

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"
MALLOCONF = "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)
General Notes (Continued)

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.


Platform Notes

Sysinfo program /home/cpu2017-1.1.0-ic19.1.1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed6b16e46a485a0011
running on localhost.localdomain Wed Jun 17 14:45:03 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-2236 CPU @ 3.40GHz
  1 "physical id"s (chips)
  12 "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: 12
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
CPU(s): 12
On-line CPU(s) list: 0-11
Thread(s) per core: 2
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-2236 CPU @ 3.40GHz

(Continued on next page)
Lenovo Global Technology

ThinkSystem ST50
(3.40 GHz, Intel Xeon E-2236)

**SPEC CPU®2017 Integer Speed Result**

Copyright 2017-2020 Standard Performance Evaluation Corporation

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**Lenovo Global Technology**

**ThinkSystem ST50**
(3.40 GHz, Intel Xeon E-2236)

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

---

**SPECspeed®2017_int_base = 12.4**

**SPECspeed®2017_int_peak = 12.7**

---

**Platform Notes (Continued)**

- **Stepping:** 10
- **CPU MHz:** 4707.933
- **CPU max MHz:** 4800.0000
- **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):** 0-11
- **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 aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pclidsse4_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 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 6 7 8 9 10 11
- **Node 0 size:** 64293 MB
- **Node 0 free:** 63598 MB
- **Node distances:**
  - **Node 0:**
    - 0: 10

---

From /proc/meminfo

- **MemTotal:** 65836724 kB
- **HugePages_Total:** 0
- **Hugepagesize:** 2048 kB

---

From /etc/*release* /etc/*version*

- **os-release:**
  - NAME="Red Hat Enterprise Linux"
  - VERSION="8.1 (Ootpa)"
  - ID="rhel"
  - ID_LIKE="fedora"
  - VERSION_ID="8.1"

(Continued on next page)
Lenovo Global Technology

ThinkSystem ST50
(3.40 GHz, Intel Xeon E-2236)

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9017</th>
<th>Test Date:</th>
<th>Jun-2020</th>
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<tbody>
<tr>
<td>Test Sponsor:</td>
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<td>Mar-2020</td>
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</table>

**spec**

**SPEC CPU®2017 Integer Speed Result**

**SPECspeed®2017_int_base = 12.4**  
**SPECspeed®2017_int_peak = 12.7**

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**Platform Notes (Continued)**

```
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.1 (Ootpa)"
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.1:ga
```

```
uname -a:
Linux localhost.localdomain 4.18.0-147.el8.x86_64 #1 SMP Thu Sep 26 15:52:44 UTC 2019
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 vulnerable

**Microarchitectural Data Sampling:** Mitigation: Clear CPU buffers; SMT vulnerable

**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: usercopy/swapgs barriers and __user pointer sanitization

**CVE-2017-5715 (Spectre variant 2):** Mitigation: Full generic retpoline, IBPB: conditional, IBRS_FW, STIBP: conditional, RSB filling

```
run-level 3 Jun 17 14:41
```

**SPEC is set to: /home/cpu2017-1.1.0-ic19.1.1**

```
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 xfs 812G 66G 747G 9% /home
```

From /sys/devices/virtual/dmi/id

```
BIOS: LENOVO ITE109B 04/24/2020
Vendor: LENOVO
Product: INVALID
Product Family: Lenovo Product
Serial: INVALID
```

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 HMA82GU7CJR8N-VK 16 GB 2 rank 2666
```

(End of data from sysinfo program)
### Lenovo Global Technology

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**ThinkSystem ST50**

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---

**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Specspeed®2017_int_base** = 12.4

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**Compiler Version Notes**

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<tr>
<th>Language</th>
<th>Benchmark(s)</th>
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<tr>
<td>C</td>
<td>600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak) 657.xz_s(base, peak)</td>
</tr>
<tr>
<td>C</td>
<td>600.perlbench_s(peak)</td>
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</table>

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.

<table>
<thead>
<tr>
<th>Language</th>
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<td>C++</td>
<td>620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak) 641.leela_s(base, peak)</td>
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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.

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<tr>
<th>Language</th>
<th>Benchmark(s)</th>
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<td>Fortran</td>
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Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)

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(Continued on next page)
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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)

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 -qnextgent -std=c11
-Wl, -plugin-opt=-x86-branhes-within-32B-boundaries -Wl, -z, muldefes
-xCORE-AVX2 -O3 -ffast-math -flto -mpmath=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 -qnextgent -Wl, -plugin-opt=-x86-branhes-within-32B-boundaries
-Wl, -z, muldefes -xCORE-AVX2 -O3 -ffast-math -flto -mpmath=sse
-funroll-loops -fuse-ld=gold -qopt-mem-layout-trans=4

(Continued on next page)
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SPECspeed®2017_int_base = 12.4
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
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Test Date: Jun-2020
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Base Optimization Flags (Continued)

C++ benchmarks (continued):
-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.

Peak Optimization Flags

C benchmarks:
Lenovo Global Technology
ThinkSystem ST50
(3.40 GHz, Intel Xeon E-2236)

SPECspeed®2017_int_base = 12.4
SPECspeed®2017_int_peak = 12.7

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

Peak Optimization Flags (Continued)

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
-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

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:
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-CFL-B.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-CFL-B.xml
Lenovo Global Technology  
ThinkSystem ST50  
(3.40 GHz, Intel Xeon E-2236)  

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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 2020-06-17 02:45:02-0400.  
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