SPEC CPU®2017 Integer Speed Result

Lenovo Global Technology
ThinkSystem SR860 V2
(3.90 GHz, Intel Xeon Platinum 8356H)

Copyright 2017-2020 Standard Performance Evaluation Corporation

Lenovo Global Technology

**CPU2017 License:** 9017
**Test Sponsor:** Lenovo Global Technology
**Tested by:** Lenovo Global Technology
**CPU Name:** Intel Xeon Platinum 8356H

**Max MHz:** 4400
**Nominal:** 3900
**Enabled:** 32 cores, 4 chips, 2 threads/core
**Orderable:** 2, 4 chips
**Cache L1:** 32 KB I + 32 KB D on chip per core
**L2:** 1 MB I+D on chip per core
**L3:** 35.75 MB I+D on chip per chip
**Other:** None
**Memory:** 1536 GB (48 x 32 GB 2Rx4 PC4-3200AA-R, running at 2933)
**Storage:** 1 x 960 GB SATA SSD
**Other:** None

**OS:** Red Hat Enterprise Linux release 8.2 (Ootpa)
**Compiler:** C/C++: Version 19.1.1.217 of Intel C/C++
**Parallel:** Yes
**Firmware:** Lenovo BIOS Version M5E107D 1.00 released Sep-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

**Hardware**

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
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<td>602.gcc_s</td>
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<td>605.mcf_s</td>
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<td>620.omnetpp_s</td>
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<td>623.xalancbmk_s</td>
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<td>625.x264_s</td>
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<td>631.deepsjeng_s</td>
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<td>641.leela_s</td>
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<tr>
<td>648.exchange2_s</td>
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<tr>
<td>657.xz_s</td>
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**Software**

**Test Date:** Oct-2020
**Hardware Availability:** Nov-2020
**Software Availability:** Apr-2020
Lenovo Global Technology

ThinkSystem SR860 V2
(3.90 GHz, Intel Xeon Platinum 8356H)

SPEC CPU®2017 Integer Speed Result

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**Results Table**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
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<th>Seconds</th>
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<td><strong>231</strong></td>
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<td>26.8</td>
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</table>

**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

**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/jre5.0.1-64"
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)
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SPECspeed®2017_int_base = 12.5
SPECspeed®2017_int_peak = 12.7

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

Test Date: Oct-2020
Hardware Availability: Nov-2020
Software Availability: Apr-2020

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.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
MONITOR/MWAIT set to Enabled

Sysinfo program /home/cpu2017-1.1.0-ic19.1.1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed1be6e46a485a0011
running on localhost.localdomain Mon Oct 26 18:23:29 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) Platinum 8356H CPU @ 3.90GHz
 4 "physical id"s (chips)
 64 "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 2 6 8 10 12 17 19 28
physical 1: cores 1 2 3 5 6 10 20 29
physical 2: cores 1 2 3 6 13 18 28 29
physical 3: cores 3 6 10 13 17 18 28 29

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 2
Core(s) per socket: 8

(Continued on next page)
Lenovo Global Technology
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SPECspeed®2017_int_base = 12.5
SPECspeed®2017_int_peak = 12.7

Platform Notes (Continued)

Socket(s): 4
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8356H CPU @ 3.90GHz
Stepping: 11
CPU MHz: 3231.924
CPU max MHz: 4400.0000
CPU min MHz: 1200.0000
BogoMIPS: 7800.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s): 0-7,32-39
NUMA node1 CPU(s): 8-15,40-47
NUMA node2 CPU(s): 16-23,48-55
NUMA node3 CPU(s): 24-31,56-63
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 pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
        xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
        avx f16c rdrand lahf_lm ablp_test cpuid_fault epb cat_l3 cdp_l3
        invvpid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmvi
        flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 0rms invpcid rtm
        cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
        avx512bw avx512vl xsaveopt xsaves cqm_llc cqm_occup_llc cqm_mbb_total
        cqm_mbb_local avx512_bf16 dtherm ida arat pln pts pku ospke avx512_vnni md_clear
        flush_l1d arch_capabilities

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
    available: 4 nodes (0-3)
    node 0 cpus: 0 1 2 3 4 5 6 7 32 33 34 35 36 37 38 39
    node 0 size: 386657 MB
    node 0 free: 386397 MB
    node 1 cpus: 8 9 10 11 12 13 14 15 40 41 42 43 44 45 46 47
    node 1 size: 387040 MB
    node 1 free: 386710 MB
    node 2 cpus: 16 17 18 19 20 21 22 23 48 49 50 51 52 53 54 55
    node 2 size: 387068 MB

(Continued on next page)
Platform Notes (Continued)

- node 2 free: 386574 MB
- node 3 cpus: 24 25 26 27 28 29 30 31 56 57 58 59 60 61 62 63
- node 3 size: 387067 MB
- node 3 free: 386857 MB
- node distances:
  - 0: 10 20 20 20
  - 1: 20 10 20 20
  - 2: 20 20 10 20
  - 3: 20 20 20 10

From /proc/meminfo
- MemTotal: 1584981392 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
- os-release:
  - NAME="Red Hat Enterprise Linux"
  - VERSION="8.2 (Ootpa)"
  - ID="rhel"
  - ID_LIKE="fedora"
  - VERSION_ID="8.2"
  - PLATFORM_ID="platform:el8"
  - PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"
  - ANSI_COLOR="0;31"
- redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
- system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
- system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga

uname -a:
- Linux localhost.localdomain 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020
- x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
- 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/swapgs barriers and __user pointer sanitization
- CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
- tsx_async_abort: Not affected

(Continued on next page)
**SPEC CPU®2017 Integer Speed Result**

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**Lenovo Global Technology**

ThinkSystem SR860 V2  
(3.90 GHz, Intel Xeon Platinum 8356H)

| SPECspeed®2017_int_base = 12.5 | SPECspeed®2017_int_peak = 12.7 |

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

**Platform Notes (Continued)**

run-level 3 Oct 26 18:20

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

Filesystem Type Size Used Avail Use% Mounted on  
/dev/sda2 xfs 838G 40G 798G 5% /home

From /sys/devices/virtual/dmi/id  
BIOS: Lenovo M5E107D-1.00 09/16/2020  
Vendor: Lenovo  
Product: ThinkSystem SR860 V2  
Product Family: ThinkSystem  
Serial: none

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:  
48x Samsung M393A4K40DB3-CWE 32 GB 2 rank 3200

(End of data from sysinfo program)  
Memory on this system run at 2933 MHz due to CPU limitation.

**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) |
==============================================================================

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Lenovo Global Technology
ThinkSystem SR860 V2
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SPECspeed®2017_int_base = 12.5
SPECspeed®2017_int_peak = 12.7

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

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.

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
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
Lenovo Global Technology
ThinkSystem SR860 V2
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology
Test Date: Oct-2020
Hardware Availability: Nov-2020
Software Availability: Apr-2020

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 -gnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -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 -gnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX512 -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
-liqmalloc

Fortran benchmarks:
-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -xCORE-AVX512
-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

(Continued on next page)
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SPECspeed®2017_int_base = 12.5
SPECspeed®2017_int_peak = 12.7

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

Fortran benchmarks:
ifort

Peak Compiler Invocation (Continued)

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:

600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX512 -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.profdatal pass 2) -xCORE-AVX512 -flto
-Ofast(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-AVX512 -flto -O3 -ffast-math
-fuse-ld=gold -qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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ThinkSystem SR860 V2  
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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology

**Test Date:** Oct-2020  
**Hardware Availability:** Nov-2020  
**Software Availability:** Apr-2020

## Peak Optimization Flags (Continued)

- 657.xz_s: basepeak = yes
- C++ benchmarks:
  - 620.omnetpp_s: basepeak = yes
  - 623.xalancbnk_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:


You can also download the XML flags sources by saving the following links: