SPEC® CPU2017 Floating Point Speed Result

Lenovo Global Technology
ThinkSystem ST550
(3.60 GHz, Intel Xeon Platinum 8156)

SPECspeed2017_fp_base = 53.8
SPECspeed2017_fp_peak = 54.7

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

Hardware
CPU Name: Intel Xeon Platinum 8156
Max MHz.: 3700
Nominal: 3600
Enabled: 8 cores, 2 chips
Orderable: 1.2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 16.5 MB I+D on chip per chip
Other: None
Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R)
Storage: 1 x 800 GB SAS SSD
Other: None

Software
OS: SUSE Linux Enterprise Server 12 SP2 (x86_64)
Compiler: C/C++: Version 18.0.0.128 of Intel C/C++
Compiler for Linux:
Fortran: Version 18.0.0.128 of Intel Fortran
Compiler for Linux:
Parallel: Yes
Firmware: Lenovo BIOS Version O0E109N 1.10 released Oct-2017
File System: btrfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None

Tested by Lenovo Global Technology
Hardware Availability: Aug-2017
Software Availability: Sep-2017
Test Date: Jan-2018

Threads

<table>
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<tr>
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<td>644.nab_s</td>
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<tr>
<td>654.roms_s</td>
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607.cactuBSSN_s
619.lbm_s
621.wrf_s
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628.pop2_s
638.imagick_s
644.nab_s
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654.roms_s

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SPECspeed2017_fp_base (53.8)
SPECspeed2017_fp_peak (54.7)
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SPECspeed2017_fp_peak = 54.7

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

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017.1.0.2.ic18.0/lib/ia32:/home/cpu2017.1.0.2.ic18.0/lib/intel64"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017.1.0.2.ic18.0/je5.0.1-32:/home/cpu2017.1.0.2.ic18.0/je5.0.1-64"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM memory using Redhat Enterprise Linux 7.4
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
No: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
No: 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.
No: 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.

This benchmark result is intended to provide perspective on past performance using the historical hardware and/or software described on this result page.

The system as described on this result page was formerly

(Continued on next page)
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SPECspeed2017_fp_base = 53.8

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Test Sponsor: Lenovo Global Technology
Test Date: Jan-2018
Tested by: Lenovo Global Technology
Hardware Availability: Aug-2017
Tested by: Lenovo Global Technology
Software Availability: Sep-2017

General Notes (Continued)

generally available. At the time of this publication, it may not be shipping, and/or may not be supported, and/or may fail to meet other tests of General Availability described in the SPEC OSG Policy document, http://www.spec.org/osg/policy.html

This measured result may not be representative of the result that would be measured were this benchmark run with hardware and software available as of the publication date.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Hyper-Threading set to Disable
Adjacent Cache Prefetch set to Disable
DCU Streamer Prefetcher set to Disable
DCA set to Enable
Uncore Frequency Scaling set to Disable
MONITORMWAIT set to Enable
SNC set to Enable
XPT Prefetcher set to Enable
Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on ST550 Fri Jan 26 17:35:19 2018

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 8156 CPU @ 3.60GHz
 2 "physical id"s (chips)
 8 "processors"
core, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
cpu cores : 4
siblings : 4
physical 0: cores 1 2 5 11
physical 1: cores 1 5 9 13

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 8
On-line CPU(s) list: 0-7

(Continued on next page)
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Copyright 2017-2018 Standard Performance Evaluation Corporation

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Thread(s) per core: 1
Core(s) per socket: 4
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8156 CPU @ 3.60GHz
Stepping: 4
CPU MHz: 3591.573
BogoMIPS: 7183.14
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 16896K
NUMA node0 CPU(s): 0,1
NUMA node1 CPU(s): 2,3
NUMA node2 CPU(s): 4,6
NUMA node3 CPU(s): 5,7
Flag: 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 art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
aperfmpref eagerfpu 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 abm 3dnowprefetch ida arat epb pln pts dtherm intel_pt
tpr_shadow vnni flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
erms invpcid rtm cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd
avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc

/platform/cpuinfo cache data
 cache size : 16896 KB

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
 node 0 size: 96357 MB
 node 0 free: 95984 MB
 node 1 cpus: 2 3
 node 1 size: 96753 MB
 node 1 free: 96437 MB
 node 2 cpus: 4 6
 node 2 size: 96753 MB
 node 2 free: 96427 MB
 node 3 cpus: 5 7
 node 3 size: 96750 MB

(Continued on next page)
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Platform Notes (Continued)

node 3 free: 96341 MB
node distances:
node 0 1 2 3
0: 10 11 21 21
1: 11 10 21 21
2: 21 21 10 11
3: 21 21 11 10

From /proc/meminfo
MemTotal: 395893620 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release*/etc/*version*
SuSE-release:
SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 2
# This file is deprecated and will be removed in a future service pack or release.
# Please check /etc/os-release for details about this release.
os-release:
NAME="SLES"
VERSION="12-SP2"
VERSION_ID="12.2"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:
Linux ST550 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC 2016 (9464f67) x86_64
ox86_64 x86_64 GNU/Linux

run-level 3 Jan 26 17:33

SPEC is set to: /home/cpu2017.1.0.2.ic18.0

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.

BIOS Lenovo -[00E109N-1.10]- 10/16/2017
Memory:
12x Hynix HMA84GR7AFR4N-VK 32 GB 2 rank 2666

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Platform Notes (Continued)

(End of data from sysinfo program)

Compiler Version Notes

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Base Compiler Invocation

C benchmarks:
iccc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Base Portability Flags

603.bwaves_s: -DSPEC_LP64

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

607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
-assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -align array32byte

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte

Benchmarks using Fortran, C, and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte

Base Other Flags

C benchmarks:
-m64 -std=c11

Fortran benchmarks:
-m64

Benchmarks using both Fortran and C:
-m64 -std=c11
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Base Other Flags (Continued)

Benchmarks using Fortran, C, and C++:
  -m64  -std=c11

Peak Compiler Invocation

C benchmarks:
  icc

Fortran benchmarks:
  ifort

Benchmarks using both Fortran and C:
  ifort  icc

Benchmarks using Fortran, C, and C++:
  icpc  icc  ifort

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
  619.lbm_s: -prof-gen(pass 1)  -prof-use(pass 2)  -O2  -xCORE-AVX512
            -qopt-prefetch  -ipo  -O3  -ffinite-math-only  -no-prec-div
            -qopt-mem-layout-trans=3  -DSPEC_SUPPRESS_OPENMP  -qopenmp
            -DSPEC_OPENMP

  638.imagick_s: -xCORE-AVX512  -ipo  -O3  -no-prec-div  -qopt-prefetch
                 -ffinite-math-only  -qopt-mem-layout-trans=3  -qopenmp
                 -3-DSPEC_OPENMP

  644.nab_s: Same as 638.imagick_s

Fortran benchmarks:
  -prof-gen(pass 1)  -prof-use(pass 2)  -DSPEC_SUPPRESS_OPENMP

(Continued on next page)
Lenovo Global Technology
ThinkSystem ST550
(3.60 GHz, Intel Xeon Platinum 8156)

**SPEC CPU2017 Floating Point Speed Result**

**SPECspeed2017_fp_base = 53.8**
**SPECspeed2017_fp_peak = 54.7**

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<th>9017</th>
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<td>Lenovo Global Technology</td>
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**Peak Optimization Flags (Continued)**

For Fortran benchmarks (continued):
-DSPEC_OPENMP -02 -xCORE-AVX512 -qopt-prefetch -ipo -O3
-ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -align array32byte

- Fortran benchmarks using both Fortran and C:
  621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -02 -xCORE-AVX512
  -qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
  -qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
  -DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

  627.cam4_s: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
  -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
  -DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

  628.pop2_s: Same as 621.wrf_s

- Fortran benchmarks using Fortran, C, and C++:
  -prof-gen(pass 1) -prof-use(pass 2) -02 -xCORE-AVX512 -qopt-prefetch
  -ipo -O3 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3
  -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs
  -align array32byte

**Peak Other Flags**

C benchmarks:
-m64 -std=c11

Fortran benchmarks:
-m64

- Fortran benchmarks using both Fortran and C:
  -m64 -std=c11

- Fortran benchmarks using Fortran, C, and C++:
  -m64 -std=c11

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.html
# Lenovo Global Technology

**ThinkSystem ST550**  
*(3.60 GHz, Intel Xeon Platinum 8156)*

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

- [http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.xml](http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.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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