Lenovo Global Technology
ThinkSystem SN550
(3.20 GHz, Intel Xeon Gold 6134M)

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

CPU2017 Floating Point Speed Result

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>86.0</td>
<td>87.7</td>
</tr>
</tbody>
</table>

Hardware

CPU Name: Intel Xeon Gold 6134M
Max MHz.: 3700
Nominal: 3200
Enabled: 16 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: 24.75 MB I+D on chip per chip
Other: None
Memory: 768 GB (24 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
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None

Test Sponsor: Lenovo Global Technology
Test Date: May-2018
Hardware Availability: Aug-2017
Software Availability: Feb-2018
Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>16</td>
<td>141</td>
<td>417</td>
<td>142</td>
<td>416</td>
<td>142</td>
<td>415</td>
<td>16</td>
<td>142</td>
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<td>142</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>16</td>
<td>183</td>
<td>90.9</td>
<td>183</td>
<td>91.0</td>
<td>182</td>
<td>91.5</td>
<td>16</td>
<td>177</td>
<td>94.3</td>
<td>177</td>
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<td>619.lbm_s</td>
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<td>41.0</td>
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<td>40.9</td>
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<td>16</td>
<td>127</td>
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<tr>
<td>621.wrf_s</td>
<td>16</td>
<td>166</td>
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<td>79.4</td>
<td>166</td>
<td>79.7</td>
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<tr>
<td>627.cam4_s</td>
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<td>51.9</td>
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<td>51.7</td>
<td>171</td>
<td>52.0</td>
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<td>638.imagick_s</td>
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<td>63.5</td>
<td>227</td>
<td>63.6</td>
<td>227</td>
<td>63.5</td>
<td>16</td>
<td>227</td>
<td>63.4</td>
<td>227</td>
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<tr>
<td>644.nab_s</td>
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<td>150</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>119</td>
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<td>654.roms_s</td>
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<td>102</td>
<td>16</td>
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<td>106</td>
<td>148</td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 86.0
SPECspeed2017_fp_peak = 87.7

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
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

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Hyper-Threading set to Disable

(Continued on next page)
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Platform Notes (Continued)

MONITORMWait set to Enable
Adjacent Cache Prefetch set to Disable
LLC dead line alloc set to Disable
Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on SN550 Sun May 20 15:58:39 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) Gold 6134M CPU @ 3.20GHz
  2 "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 : 8
physical 0: cores 0 2 3 9 16 19 26 27
physical 1: cores 0 2 3 9 16 19 26 27

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 16
On-line CPU(s) list: 0-15
Thread(s) per core: 1
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6134M CPU @ 3.20GHz
Stepping: 4
CPU MHz: 3192.488
BogoMIPS: 6384.97
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
NUMA node0 CPU(s): 0-7
NUMA node1 CPU(s): 8-15
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov

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Platform Notes (Continued)

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 xtrm 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 invpcid_single pln pts
dtherm intel_pt rtb_cxsw spec_ctrl retpoline kaiser tpr_shadow vmx flexpriority
rvt hypervisor fpgasbase tsc_adjust bm1 hle avx2 smep bmi2 erms invpcid rtm cqm mp
f16x512 avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
xsaved xgetbv1 cqg_llc cqg_occup_llc

cache size : 25344 KB
From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
    available: 2 nodes (0-1)
    node 0 cpus: 0 1 2 3 4 5 6 7
    node 0 size: 386635 MB
    node 0 free: 385550 MB
    node 1 cpus: 8 9 10 11 12 13 14 15
    node 1 size: 387040 MB
    node 1 free: 386169 MB
    node distances:
      node   0   1
      0:  10  21
      1:  21  10

From /proc/meminfo
    MemTotal: 792244424 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"

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Platform Notes (Continued)

uname -a:
    Linux SN550 4.4.114-92.64-default #1 SMP Thu Feb 1 19:18:19 UTC 2018 (c6ce5db) x86_64
    x86_64 x86_64 GNU/Linux

run-level 3 May 20 10:37

SPEC is set to: /home/cpu2017.1.0.2.ic18.0
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sda4      xfs   687G  137G  550G  20% /home

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 -[IVE113W-1.12]- 02/06/2018
    Memory:
    24x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666

(End of data from syinfo program)

Compiler Version Notes

==============================================================================
CC  619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)□
==============================================================================
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================

==============================================================================
CC   619.lbm_s(peak)□
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icc (ICC) 18.0.0 20170811
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==============================================================================
FC  607.cactuBSSN_s(base)
==============================================================================
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

(Continued on next page)
<table>
<thead>
<tr>
<th>Compiler Version Notes (Continued)</th>
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</thead>
</table>

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### FC 607.cactuBSSN_s(peak)
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icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
---

### FC 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
---

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
---

### FC 603.bwaves_s(peak) 649.fotonik3d_s(peak) 654.roms_s(peak)
---

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
---

### CC 621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(base)
---

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
---

### CC 621.wrf_s(peak) 628.pop2_s(peak)
---

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SPEC CPU2017 Floating Point Speed Result

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Base 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

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
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-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX2 -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-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte

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Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:
	-xCORE-AVX2	-ipo	-03	-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

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
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**Peak Optimization Flags**

**C benchmarks:**

- 619.lbm_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2  
  qospt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div  
  -qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp  
  -DSPEC_OPENMP

- 638.imagick_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
  -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp  
  -DSPEC_OPENMP

- 644.nab_s: Same as 638.imagick_s

**Fortran benchmarks:**

- -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP  
  -DSPEC_OPENMP -O2 -xCORE-AVX2 -qopt-prefetch -ipo -O3  
  -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3 -qopenmp  
  -nostandard-realloc-lhs -align array32byte

**Benchmarks using both Fortran and C:**

- 621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2  
  -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-AVX2 -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

**Benchmarks using Fortran, C, and C++:**

- -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2 -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

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**Peak Other Flags**

**C benchmarks:**

- -m64 -std=c11

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(Continued on next page)
## Peak Other Flags (Continued)

Fortran benchmarks:
- `-m64`

Benchmarks using both Fortran and C:
- `-m64 -std=c11`

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](http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.html)
- [http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-C.html](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-C.html)

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