# SPEC® CPU2017 Floating Point Speed Result

**Lenovo Global Technology**

**ThinkSystem SD650**

(3.00 GHz, Intel Xeon Gold 6136)

**SPECspeed2017_fp_base = 101**

**SPECspeed2017_fp_peak = 102**

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

**Test Date:** Jun-2018
**Hardware Availability:** Mar-2018
**Software Availability:** Feb-2018

## Hardware

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base (101)</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>118</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>120</td>
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<tr>
<td>619.lbm_s</td>
<td>41.6</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>90.8</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>66.0</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>64.0</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>89.7</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>167</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>76.5</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>110</td>
</tr>
</tbody>
</table>

**CPU Name:** Intel Xeon Gold 6136
**Max MHz.:** 3700
**Nominal:** 3000
**Enabled:** 24 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:** 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R)
**Storage:** 1 x 960 GB SATA 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++
**Parallel:** Yes
**Firmware:** Lenovo BIOS Version OTE105K 1.00 released Mar-2018
**System State:** Run level 3 (multi-user)
**Base Pointers:** 64-bit
**Peak Pointers:** 64-bit
**Other:** None
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>137</td>
<td>115</td>
</tr>
</tbody>
</table>

**SPECspeed2017_fp_base** = 101

**SPECspeed2017_fp_peak** = 102

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
**SPEC CPU2017 Floating Point Speed Result**

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**Lenovo Global Technology**

ThinkSystem SD650  
(3.00 GHz, Intel Xeon Gold 6136)  

<table>
<thead>
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**Test Date:** Jun-2018  
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**Software Availability:** Feb-2018

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**Platform Notes (Continued)**

Adjacent Cache Prefetch set to Disable  
DCU Streamer Prefetcher set to Disable  
MONITOR/MWAIT set to Enable  
DCA set to Enable  
Stale AtoS set to Enable  
Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo  
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f  
running on ocl Mon Jun 11 09:43:03 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 6136 CPU @ 3.00GHz
 2  "physical id"s (chips)
 24 "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 : 12
siblings : 12
  physical 0: cores 0 1 2 3 4 9 10 16 18 19 25 26
  physical 1: cores 0 1 2 3 4 8 10 11 18 24 25 27
```

From lscpu:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 24
On-line CPU(s) list: 0-23
Thread(s) per core: 1
Core(s) per socket: 12
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6136 CPU @ 3.00GHz
Stepping: 4
CPU MHz: 2992.960
BogoMIPS: 5985.92
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
NUMA node0 CPU(s): 0-11
```

(Continued on next page)
Lenovo Global Technology
ThinkSystem SD650
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<td>Lenovo Global Technology</td>
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<td>Feb-2018</td>
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</tbody>
</table>

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**Platform Notes (Continued)**

NUMA node1 CPU(s): 12-23
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 art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
aperfmperf 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 pml pts
dtherm intel_pt rsb_ctxsw spec_ctrl retpoline kaiser tpr_shadow vmx vsx vmpx
avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
xsavec xgetbv1 cqm_llc cqm_occup_llc

```
From /proc/cpuinfo cache data
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 8 9 10 11
 node 0 size: 193109 MB
 node 0 free: 192447 MB
 node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23
 node 1 size: 193504 MB
 node 1 free: 193113 MB
 node distances:
 node  0  1
  0: 10 21
  1: 21 10

From /proc/meminfo
 MemTotal: 395892504 KB
 HugePages_Total: 0
 Hugepagesize: 4096 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"

(Continued on next page)
Platform Notes (Continued)

ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:
   Linux oc1 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 Jun 11 09:41

SPEC is set to: /home/cpu2017.1.0.2.ic18.0
   Filesystem     Type Size  Used Avail Use% Mounted on
   /dev/sda3      xfs   446G  102G  345G  23% /

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 -[OTE105K-1.00]- 03/13/2018
   Memory:
      4x NO DIMM NO DIMM
      12x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666

(End of data from sysinfo 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.
==============================================================================

==============================================================================
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
(Continued on next page)
### Lenovo Global Technology

**ThinkSystem SD650 (3.00 GHz, Intel Xeon Gold 6136)**

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<tr>
<th>Test Date</th>
<th>Hardware Availability</th>
<th>Software Availability</th>
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<tbody>
<tr>
<td>Jun-2018</td>
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<tr>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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<tr>
<td>101</td>
<td>102</td>
</tr>
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</table>

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Compiled by:** Lenovo Global Technology

### Compiler Version Notes (Continued)

```plaintext
FC  607.cactuBSSN_s(peak)

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

icpc (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.

Regressor (C) 1985-2017 Intel Corporation. All rights reserved.

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

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

Regressor (C) 1985-2017 Intel Corporation. All rights reserved.
```

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Lenovo Global Technology
ThinkSystem SD650
(3.00 GHz, Intel Xeon Gold 6136)

SPECspeed2017_fp_base = 101
SPECspeed2017_fp_peak = 102

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-AVX512 -ipo -03 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX512 -ipo -03 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-1hs -align array32byte

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -03 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-1hs -align array32byte

(Continued on next page)
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---

**BASE IMPROVEMENTS**

**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

---

**Base Optimization Flags (Continued)**

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

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

---

**Peak Portability Flags**

Same as Base Portability Flags
Lenovo Global Technology
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### SPEC CPU2017 Floating Point Speed Result

SPECspeed2017_fp_base = 101
SPECspeed2017_fp_peak = 102

### 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
-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-AVX512 -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-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

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

-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 -nostandard-realloc-lhs
-align array32byte

### Peak Other Flags

**C benchmarks:**

-m64 -std=c11
Lenovo Global Technology
ThinkSystem SD650
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Test Date: Jun-2018
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Software Availability: Feb-2018

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/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/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-C.xml

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