Lenovo Global Technology
ThinkSystem SD650
(3.00 GHz, Intel Xeon Platinum 8158)

**CPU2017 License:** 9017
**Test Sponsor:** Lenovo Global Technology
**Tested by:** Lenovo Global Technology
**CPU2017 License:** 9017
**Test Date:** Jun-2018
**Hardware Availability:** Mar-2018
**Software Availability:** Feb-2018

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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<tr>
<td>101</td>
<td>102</td>
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<table>
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<tr>
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<th>SPECspeed2017_fp_base</th>
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<tr>
<td>603.bwaves_s</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<td>619.lbm_s</td>
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<td>621.wrf_s</td>
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<td>644.nab_s</td>
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<td>649.fotonik3d_s</td>
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<td></td>
</tr>
<tr>
<td>654.roms_s</td>
<td>115</td>
<td></td>
</tr>
</tbody>
</table>

**Hardware**

**CPU Name:** Intel Xeon Platinum 8158
**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 core
**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)
**Kernel:** 4.4.114-92.64-default
**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 OTE105K 1.00 released Mar-2018
**File System:** xfs
**System State:** Run level 3 (multi-user)
**Base Pointers:** 64-bit
**Peak Pointers:** 64-bit
**Other:** None
## SPEC CPU2017 Floating Point Speed Result

**Lenovo Global Technology**  
ThinkSystem SD650  
(3.00 GHz, Intel Xeon Platinum 8158)

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### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
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<td>644.nab_s</td>
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<td>142</td>
</tr>
</tbody>
</table>

**SPECspeed2017_fp_base = 101**  
**SPECspeed2017_fp_peak = 102**

### 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 syncd 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)

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 linux-nlle Sun Jun 10 19:24:02 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 8158 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 8 9 10 11 18 19 24 27
physical 1: cores 0 1 2 3 8 9 10 11 18 19 24 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) Platinum 8158 CPU @ 3.00GHz
Stepping:              4
CPU MHz:               2992.956
BogoMIPS:              5985.91
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)
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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 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 invpcid_single pln pts
dtherm intel_pt rsb_ctsxw spec_ctrl retpoline kaiser tpr_shadow vmi fexpriority
ept vpid fpgasbase 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

/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: 192584 MB
  node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23
  node 1 size: 193504 MB
  node 1 free: 193138 MB
  node distances:
  node   0   1
  0:  10  21
  1:  21  10

From /proc/meminfo
  MemTotal: 395892880 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

/usr/bin/lsb_release -d
  SUSE Linux Enterprise Server 12 SP2

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"

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**Platform Notes (Continued)**

`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 linux-nlle 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 10 19:22

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 -[OTE105K-1.00]- 03/13/2018`  
`Memory:`  
`12x Hynix HMA84GR7AFR4N-VK 32 GB 2 rank 2666`  
`4x NO DIMM NO DIMM`

(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)
```

(Continued on next page)
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SPEC CPU2017 Floating Point Speed Result
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Compiler Version Notes (Continued)

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.

------------------------------------------------------------------------------
LCM 2018.0.0 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 607.cactuBSSN_s(peak)
------------------------------------------------------------------------------
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.

==============================================================================
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Compiler Version Notes (Continued)

icc (ICC) 18.0.0 20170811
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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-AVX512 -ipo -03 -no-prec-div -gopt-prefetch
-ffinite-math-only -gopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX512 -ipo -03 -no-prec-div -gopt-prefetch
-ffinite-math-only -gopt-mem-layout-trans=3 -qopenmp

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

Fortran benchmarks (continued):
- 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

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
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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
-qo-opt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qo-opt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP

638.imagick_s: -xCORE-AVX512 -ipo -O3 -no-prec-div -qo-opt-prefetch
-ffinite-math-only -qo-opt-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 -qo-opt-prefetch -ipo -O3
-ffinite-math-only -no-prec-div -qo-opt-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
-qo-opt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qo-opt-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 -qo-opt-prefetch
-ffinite-math-only -qo-opt-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 -qo-opt-prefetch
-ipo -O3 -ffinite-math-only -no-prec-div -qo-opt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs
-align array32byte
### Lenovo Global Technology

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<tr>
<th>SPECspeed2017_fp_peak</th>
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**Peak 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

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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU2017 v1.0.2 on 2018-06-10 07:24:01-0400.  