



# SPEC® CPU2017 Floating Point Speed Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

## Lenovo Global Technology

ThinkSystem SR950  
(2.30 GHz, Intel Xeon Gold 6140M)

**SPECSspeed2017\_fp\_base = 157**

**SPECSspeed2017\_fp\_peak = 158**

CPU2017 License: 9017

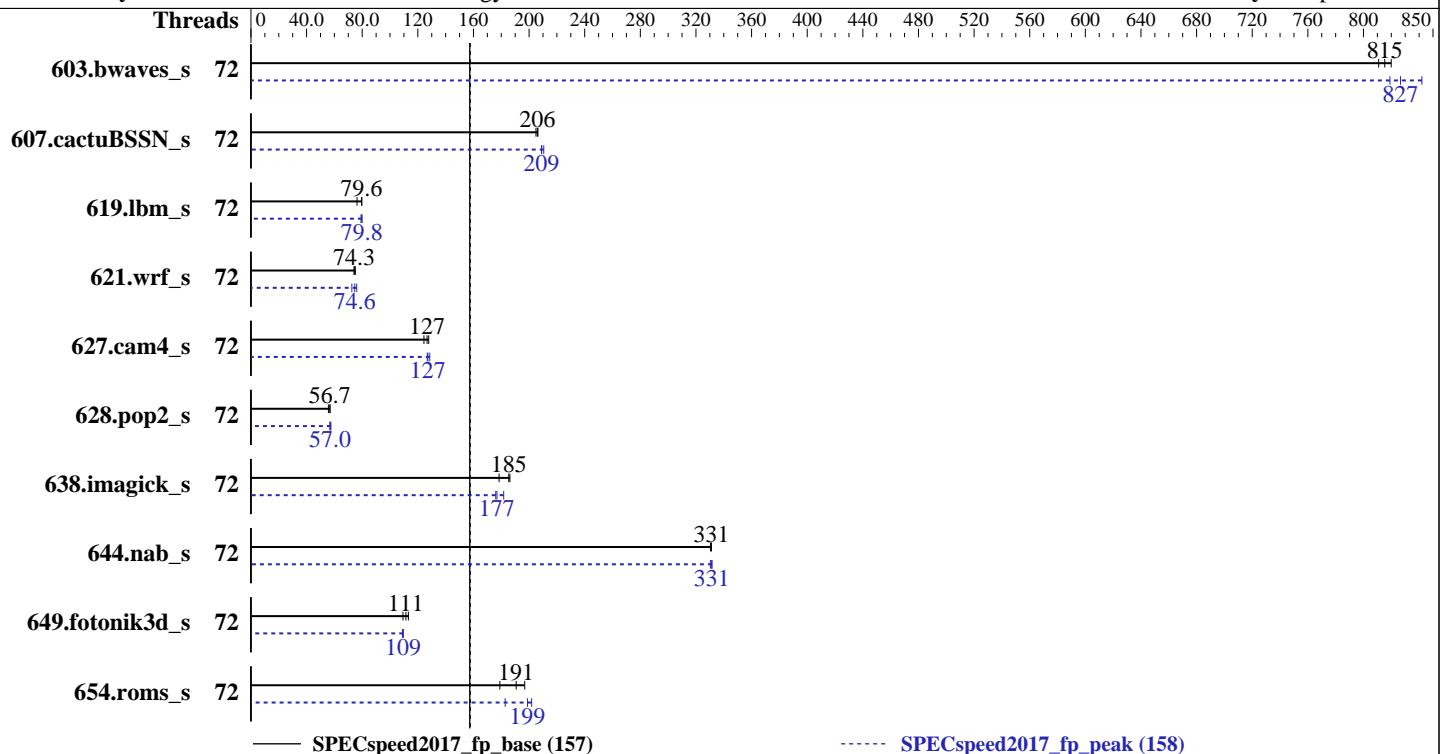
Test Date: Oct-2017

Test Sponsor: Lenovo Global Technology

Hardware Availability: Sep-2017

Tested by: Lenovo Global Technology

Software Availability: Sep-2017



— SPECSspeed2017\_fp\_base (157)

----- SPECSspeed2017\_fp\_peak (158)

### Hardware

CPU Name: Intel Xeon Gold 6140M  
Max MHz.: 3700  
Nominal: 2300  
Enabled: 72 cores, 4 chips  
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: 24.75 MB I+D on chip per chip  
Other: None  
Memory: 1536 GB (48 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 4.4.21-69-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 PSE105X 1.00 released Aug-2017  
File System: xfs  
System State: Run level 3 (multi-user)  
Base Pointers: 64-bit  
Peak Pointers: 64-bit  
Other: None



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## Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	72	<b>72.4</b>	<b>815</b>	72.8	811	72.0	820	72	<b>71.4</b>	<b>827</b>	72.0	819	70.1	842
607.cactuBSSN_s	72	80.8	206	<b>80.9</b>	<b>206</b>	81.3	205	72	79.8	209	79.2	211	<b>79.7</b>	<b>209</b>
619.lbm_s	72	<b>65.8</b>	<b>79.6</b>	68.7	76.3	65.7	79.7	72	66.2	79.2	<b>65.7</b>	<b>79.8</b>	65.7	79.8
621.wrf_s	72	178	74.2	176	75.1	<b>178</b>	<b>74.3</b>	72	174	76.1	182	72.5	<b>177</b>	<b>74.6</b>
627.cam4_s	72	<b>70.0</b>	<b>127</b>	69.3	128	71.2	124	72	<b>69.7</b>	<b>127</b>	69.9	127	68.9	129
628.pop2_s	72	<b>209</b>	<b>56.7</b>	213	55.7	209	56.9	72	209	56.8	207	57.5	<b>208</b>	<b>57.0</b>
638.imagick_s	72	<b>77.8</b>	<b>185</b>	80.9	178	77.5	186	72	79.4	182	82.0	176	<b>81.5</b>	<b>177</b>
644.nab_s	72	<b>52.8</b>	<b>331</b>	52.8	331	52.9	330	72	52.9	330	<b>52.7</b>	<b>331</b>	52.7	331
649.fotonik3d_s	72	83.4	109	80.5	113	<b>81.8</b>	<b>111</b>	72	83.6	109	83.2	110	<b>83.3</b>	<b>109</b>
654.roms_s	72	88.0	179	<b>82.6</b>	<b>191</b>	80.0	197	72	86.1	183	78.0	202	<b>79.2</b>	<b>199</b>
<b>SPECSspeed2017_fp_base = 157</b>														
<b>SPECSspeed2017_fp_peak = 158</b>														

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:

KMP\_AFFINITY = "granularity=fine,compact"

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"

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

## Platform Notes

BIOS configuration:

Choose Operating Mode set to Maximum Performance

Hyper-Threading set to Disable

MONITORWAIT set to Enable

DCU Streamer Prefetcher set to Disable

XPT Prefetcher set to Enable

Stale AtoS set to Enable

DCA set to Enable

Trusted Execution Technology set to Enable

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## Platform Notes (Continued)

LLC Deadline Alloc set to Disable

Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo

Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f

running on linux-ciok Sun Oct 29 02:22:26 2017

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 6140M CPU @ 2.30GHz
        4 "physical id"s (chips)
        72 "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 : 18
    siblings   : 18
    physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
    physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
    physical 2: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
    physical 3: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
```

From lscpu:

```
Architecture:           x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                72
On-line CPU(s) list:  0-71
Thread(s) per core:   1
Core(s) per socket:   18
Socket(s):             4
NUMA node(s):          4
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 85
Model name:            Intel(R) Xeon(R) Gold 6140M CPU @ 2.30GHz
Stepping:               4
CPU MHz:                2294.600
BogoMIPS:              4589.20
Virtualization:        VT-x
L1d cache:              32K
L1i cache:              32K
L2 cache:                1024K
L3 cache:                25344K
NUMA node0 CPU(s):     0-17
NUMA node1 CPU(s):     18-35
NUMA node2 CPU(s):     36-53
```

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## Platform Notes (Continued)

```
NUMA node3 CPU(s):      54-71
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
               aperfmpfperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
               fma cxl16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movebe popcnt tsc_deadline_timer aes
               xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ida arat epb pln pts dtherm intel_pt
               tpr_shadow vnmi 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 xsavenc 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: 4 nodes (0-3)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
node 0 size: 386500 MB
node 0 free: 385327 MB
node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
node 1 size: 387042 MB
node 1 free: 385848 MB
node 2 cpus: 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
node 2 size: 387042 MB
node 2 free: 385716 MB
node 3 cpus: 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
node 3 size: 387038 MB
node 3 free: 385617 MB
node distances:
node   0   1   2   3
  0: 10 21 21 21
  1: 21 10 21 21
  2: 21 21 10 21
  3: 21 21 21 10
```

From /proc/meminfo

```
MemTotal:       1584767344 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.
```

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## Platform Notes (Continued)

```
# 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 linux-ciok 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC 2016 (9464f67)
x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Oct 28 21:19

SPEC is set to: /home/cpu2017.1.0.2.ic18.0
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda3        xfs   445G   27G   418G   7%  /


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 -[PSE105X-1.00]- 08/17/2017
Memory:
 48x NO DIMM NO DIMM
 48x 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.
-----

=====
CC 619.lbm_s(peak)
-----
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

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## Compiler Version Notes (Continued)

=====

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.

=====

=====

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)

CC 621.wrf\_s(peak) 628.pop2\_s(peak)

```
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.
```

## 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 -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC\_OPENMP

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## Base Optimization Flags (Continued)

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
```

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
```

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## Peak Compiler Invocation (Continued)

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  
-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

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## Peak Optimization Flags (Continued)

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
```

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-Flags-V1.2-SKL-F.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-Flags-V1.2-SKL-F.xml>

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Tested with SPEC CPU2017 v1.0.2 on 2017-10-28 14:22:26-0400.

Report generated on 2018-10-31 16:08:40 by CPU2017 PDF formatter v6067.

Originally published on 2017-12-21.